

NEC

Server MC2200

NEC

User's Guide

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Using This Guide

The MC2200 User's Guide provides a quick reference to information about your system. Its goal is to familiarize you with your system and the tasks necessary for system configuring and upgrading.

This guide contains the following information:

- **Chapter 1, “System Overview”** provides an overview of your system and describes your system's major system components. See this chapter to familiarize yourself with your system.
- **Chapter 2, “Setting Up the System”** tells you how to select a site, unpack the system, assemble the rack-mount subsystem, make cable connections, and power on your system.
- **Chapter 3, “Configuring Your System”** shows you how to configure the system and run the Resource Configuration Utility (RCU), BIOS Setup Utility, and the SCSISelect Utility. Chapter 4 also tells you how to configure system board jumpers to set specific operating parameters. This chapter also provides information on system board jumper settings.
- **Chapter 4, “Upgrading Your System”** provides you with instructions for upgrading your system with an additional processor, optional memory, options cards, and peripheral devices.
- **Chapter 5, “Problem Solving”** contains helpful information for solving problems that might occur with your system.
- **Appendix A, “System Cabling”** includes cabling information for the two onboard SCSI controllers, the onboard IDE controllers, and the optional RAID controllers.
- **Appendix B, “System Status Hardware Support Information”** helps you identify a system status hardware item indicated by one of several software monitoring components.
- **“Glossary”** defines the standard acronyms and technical terms used in this manual.
- **“Equipment Log”** provides you with a sample equipment log for documenting the system configuration and future updates you may make to your system.

Text Conventions

This guide uses the following text conventions.

Warnings, cautions, and notes have the following meanings:

WARNING

Warnings alert you to situations that could result in serious personal injury or loss of life.

CAUTION

Cautions indicate situations that can damage the system hardware or software.

 **Note:** Notes give important information about the material being described.

- Names of keyboard keys are printed as they appear on the keyboard. For example, **Ctrl**, **Alt**, or **Enter**.
- Text or keystrokes that you enter appear as boldface type. For example, type **abc123** and press **ENTER**.
- File names are printed in uppercase letters. For example, AUTOEXEC.BAT.

Related Documents

In addition to this guide, the following system documentation is included with your server either as electronic files on EXPRESSBUILDER or as paper copy shipped with your server.

- *System Release Notes*
Release Notes provide you with the latest information about your system. This information was not available at the time your user's guide was developed.
- *Getting Started Sheet*
The Getting Started Sheet provides several easy-to-follow steps to become familiar with your server documentation and to complete your installation successfully.
- *Network Operating System Configuration Guide*
This guide contains supplemental instructions needed to install and configure the Windows NT v4.0 Network Operating System. This document is intended to complement the more detailed procedural documents available from the vendor of this network operating system.

Safety Notices



- **Caution:** To reduce the risk of electric shock which could cause personal injury, follow all safety notices. The symbols shown are used in your documentation and on your equipment to indicate safety hazards.
- **Warning:** Lithium batteries can be dangerous. Improper handling of lithium batteries may result in an explosion. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists.
- **Warning:** The detachable power supply cords are intended to serve as the disconnect devices.
- **Warning:** This equipment has a 3-wire, grounded power cords. To prevent electrical hazards, do not remove or defeat the ground prong on the power cords. Replace a power cord if it gets damaged. Contact your dealer for an exact replacement.
- **Warning:** The DC push-button on/off switch on the front panel does not turn off the system AC power. Also, +5vdc is present on the system board whenever the AC power cords are connected between the system and an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cords from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

In the U.S.A. and Canada, the power cord must be a UL-listed detachable power cord (in Canada, CSA-certified), type ST or SJT, 16 AWG, 3-conductor, provided with a molded-on NEMA type 5-15 P plug cap at one end and a molded-on cord connector body at the other end. The cord length must not exceed 9 feet (2.7 meters).

Outside the U.S.A. and Canada, the plug must be rated for 250 VAC, 10 amp minimum, and must display an international agency approval marking. The cord must be suitable for use in the end-user country. Consult your dealer or the local electrical authorities if you are unsure of the type of power cord to use in your country. The voltage change occurs via a switch in the power supply.

- **Warning:** Under no circumstances should the user attempt to disassemble the power supply. The power supply has no user-replaceable parts. Inside the power supply are hazardous voltages that can cause serious personal injury. A defective power supply must be returned to your dealer.

Safety Notices for Users Outside of the U.S.A. and Canada

- **PELV (Protected Extra-Low Voltage) Integrity:** To ensure the extra-low voltage integrity of the equipment, connect only equipment with mains-protected electrically-compatible circuits to the external ports.
- **Remote Earths:** To prevent electrical shock, connect all local (individual office) computers and computer support equipment to the same electrical circuit of the building wiring. If you are unsure, check the building wiring to avoid remote earth conditions.
- **Earth Bonding:** For safe operation, only connect the equipment to a building supply that is in accordance with current wiring regulations in your country. In the U.K., those regulations are the IEE.

Care and Handling

Use the following guidelines to properly handle and care for your system.



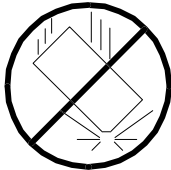
Protect the system from extremely low or high temperatures. Let the system warm (or cool) to room temperature before using it.



Keep the system away from magnetic forces.



Keep the system dry. Do not wash the system with a wet cloth or pour fluid into it.



Protect the system from being bumped or dropped.



Check the system for condensation. If condensation exists, allow it to evaporate before powering on the system.



Keep the system away from dust, sand, and dirt.

1

System Overview

- Overview
- System Chassis
- Power Supply
- Peripheral Bays
- SAF-TE (SCSI Accessed Fault Tolerant Enclosure) Board
- System Board Features
- System Security

Overview

This server is a modular, multiprocessing server based on the Intel® Pentium® II chip set. The combination of computing performance, memory capacity, and integrated I/O provides a high performance environment for many server market applications. These range from large corporations supporting remote offices to small companies looking to obtain basic connectivity capability such as file and print services, e-mail, web access, and web site server.

This server is also conveniently housed and available as a tower-based system or as a rack-mount system (fits into a standard IAE 19-inch rack assembly).

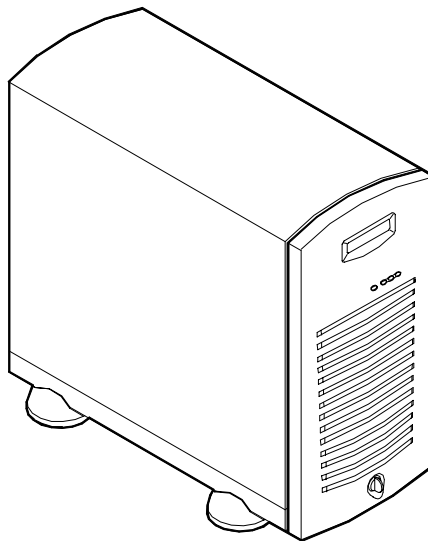


Figure 1-1 Tower-Based System Front View

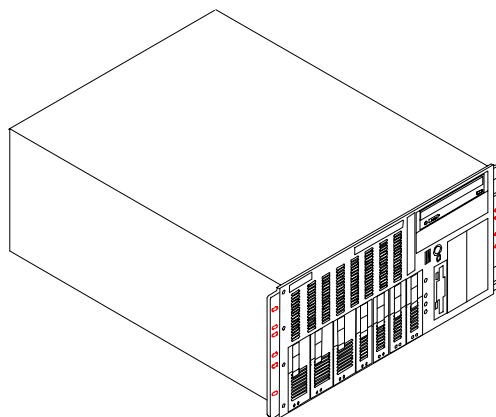


Figure 1-2 Rack-Mount System Front View

This server system is designed for minimum downtime. To this end, the server includes or has the options to include the following:

- Optional power system redundancy; in a system configured with two power supplies, the system will continue to operate with a single power supply failure.
- Self-contained power supply units that can be easily installed or removed from the back of the chassis.
- SCSI drive bays accessible from the front of the chassis.
- Hot-swap SCSI disk drive backplane; a failed drive can be removed and a new drive installed without system power being turned off, if an optional Redundant Array of Independent Disks (RAID) controller is installed.
- High degree of SCSI disk fault tolerance and advanced disk array management features through the use of RAID technology, if an optional RAID controller is installed.
- Chassis that supports up to two power supplies. The second power supply can be added to provide redundant power.

As application requirements increase, you can expand your server with an additional processor, additional memory, add-in boards and peripheral devices: tape devices, CD-ROM, diskette drives and hard disk drives.

Your server features the following major components:

- System board with one Pentium[®] II microprocessor. The system board has a processor upgrade socket for an additional processor. The board may contain up to two processors.
- Single or dual high-performance Pentium II processors packaged in Single Edge Connector (SEC or SECC2) cartridges.
- System board supports 4 EDO DIMM devices for a minimum memory size of 32 MB; total is 512 MB.
- System board has three ISA slots, two PCI slots, and one shared PCI/ISA slot for add-in boards. The system board also has onboard external I/O (serial, parallel, video) interfaces.
- System board has two video memory upgrade sockets (512 KB each) containing an additional 1 MB of video memory.
- Chassis that holds up to 12 drives: seven hot-swap bays for ultra-2 (LVD) SCSI hard drives; five removable media expansion bays with a CD-ROM reader already installed in one bay; and a half-height bay with a diskette drive already installed in the bay.
- Seven hot-swap SCSI hard disk drive bays accessible from the front of the chassis. The bays are secured behind a lockable front door where the drives can be swapped in or out of the system without powering it down, if RAID is configured in the system. (Tower models only.)
- SCSI backplane is Ultra-2 (LVD) ready.

- One standard power supply module with a slot available for an additional redundant power supply module. When an additional power supply module is installed, both the standard and additional redundant power supply module slots become hot swappable.
- Hardware monitors (temperature, fans, and voltage) and software monitors to indicate failures.
- Mechanical: Keylock at the front of the chassis and two metal padlocks loops (one at the back of each side panel). Three intrusion sensor switches for the front, left and right side of the chassis. Two of the three intrusion sensor switches (left and right side intrusion sensor switches only) become power inter-lock switches when two power supplies are installed. (Tower models only.)

System Chassis

The system chassis is an easy-to-expand, fabricated metal structure. The major system components are shown in the following illustrations.

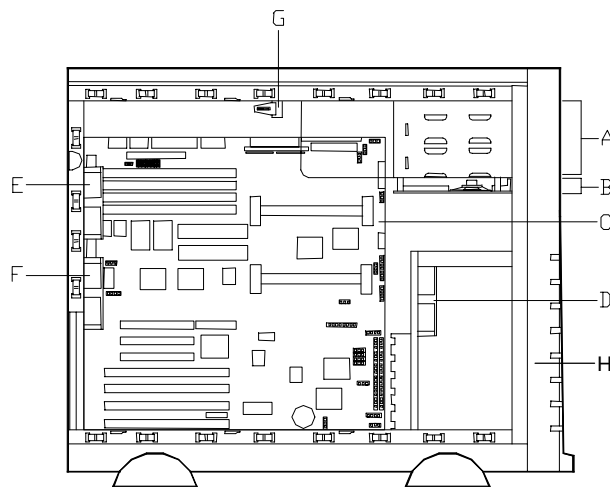


Figure 1-3 System Chassis (Left Side View)

- A. Removable media bays (2)
- B. Speaker/Switch assembly
- C. System board
- D. Front input fan
- E. Rear exhaust fan
- F. Second rear exhaust fan
- G. Interlock switch - Side Covers
- H. Intrusion switch - Front Cover

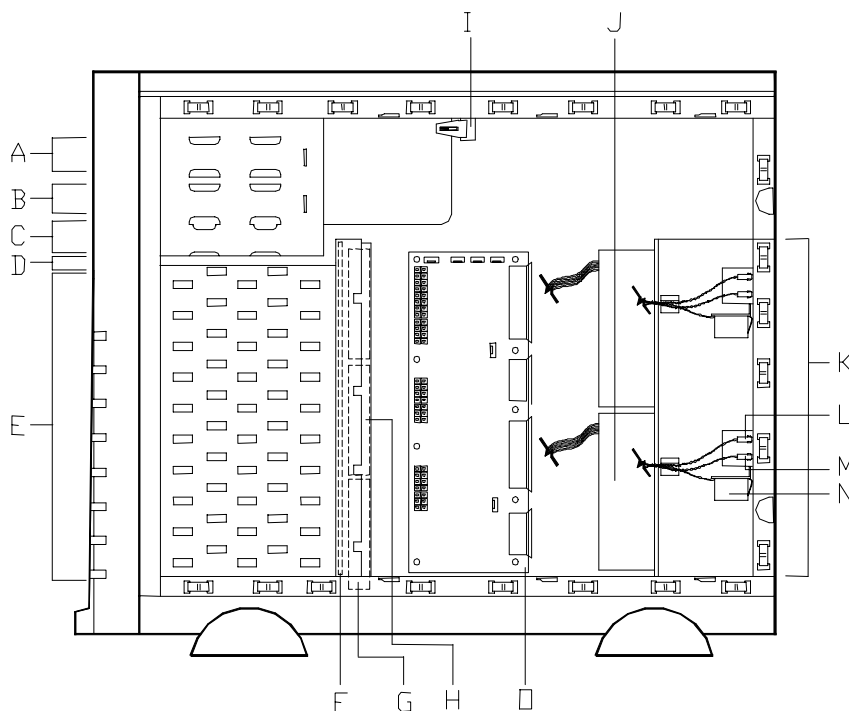


Figure 1-4 System Chassis (Right Side View)

- A. CD-ROM drive
- B. Removable media bay
- C. 1.44 MB 3.5" diskette drive
- D. SAF-TE board
- E. SCSI disk drive bays (7)
- F. SCSI backplane board
- G. Fans, behind SCSI disk drive bays (3)
- H. Fan
- I. Interlock switch
- J. Standard power supply
- K. Power supply module slots (one standard power supply slot and one optional power supply slot)
- L. Power supply status LED
- M. DC power Status LED
- N. Power available switch
- O. Power supply distribution board

Power Supply

The ATX300 watt power supply is switch-selectable for 115 or 230 Vac at an operating frequency of 50/60 Hz. It is designed to comply with existing emission standards and provides sufficient power for a fully loaded system configuration. The power supply voltage selection switch is factory set to 115Vac for systems used in the United States; it is set to 230Vac for systems used in Europe.

Peripheral Bays

The system supports a variety of standard PC AT-compatible peripheral devices. The chassis includes these peripheral bays:

- A 3.5-inch front panel bay for mounting the standard 3.5" diskette drive (supports 720 KB and 1.44 MB diskette media)
- Four 5.25-inch removable media front panel bays for mounting half-height 5.25-inch peripheral devices: standard CD ROM drive and optional tape drives, etc.
- Seven hot-swap SCSI hard disk drive bays for mounting up to seven SCSI hard disk drives in easily removable drive carriers.

Note: The SCSI hard disk drive bays contain a hot-swap back plane that require an 80-pin single connector attachment (SCA) connector on the drives that you install.

SAF-TE Board

The system has a SAF-TE (SCSI-Accessed Fault-Tolerant Enclosure) board that provides an interface for the disk subsystem to automatically integrate with peripheral packaging that supports status signals, hot swapping drives, and enclosure monitoring.

The transport mechanism for the standardized alert detection and status reporting is the SCSI bus. Disk drives, power supplies, cooling fans, and temperature are continually monitored and the conditions then reported over the SCSI bus to the system. When used with RAID management software the user can be alerted of impending or imminent disk conditions requiring attention. This allows the user to react to conditions that could normally go unnoticed until data loss.

System Board Features

Figure 1-5 shows the major components on the system board, while the following summarizes the board features.

Board set summary	Feature description
Multiple processor support	Two processor sockets; up to two Pentium II microprocessors on the system board.
Upgradable memory	Four DIMM sockets on the system board, supporting up to 512 MB memory using 128 MB DIMMs.
Add-in board support	Three dedicated ISA bus slots on the system board. Two dedicated 32-bit PCI slots on the system board. One shared PCI/ISA slot on the system board.
IDE controller	Onboard IDE controller.
SCSI controller	Onboard SCSI-2; ultra wide SCSI channel and narrow SCSI channel support (PCI-based).
BIOS	Flash memory-based BIOS (Basic Input/Output System) and Setup utilities.
Video	Integrated super VGA controller ships with 2 MB of video memory.
External device connectors	Onboard connectors for two serial ports, parallel port, PS/2-compatible keyboard and mouse, and VGA monitor.
Clock	Real-time clock/calendar (RTC).
System hardware monitoring	Detects chassis intrusion and contains sensors for temperature, voltage, and fan failure.
Configuration utilities	Resource Configuration Utility (RCU), BIOS Setup, SCSISelect Utility, and Event Log Reader.

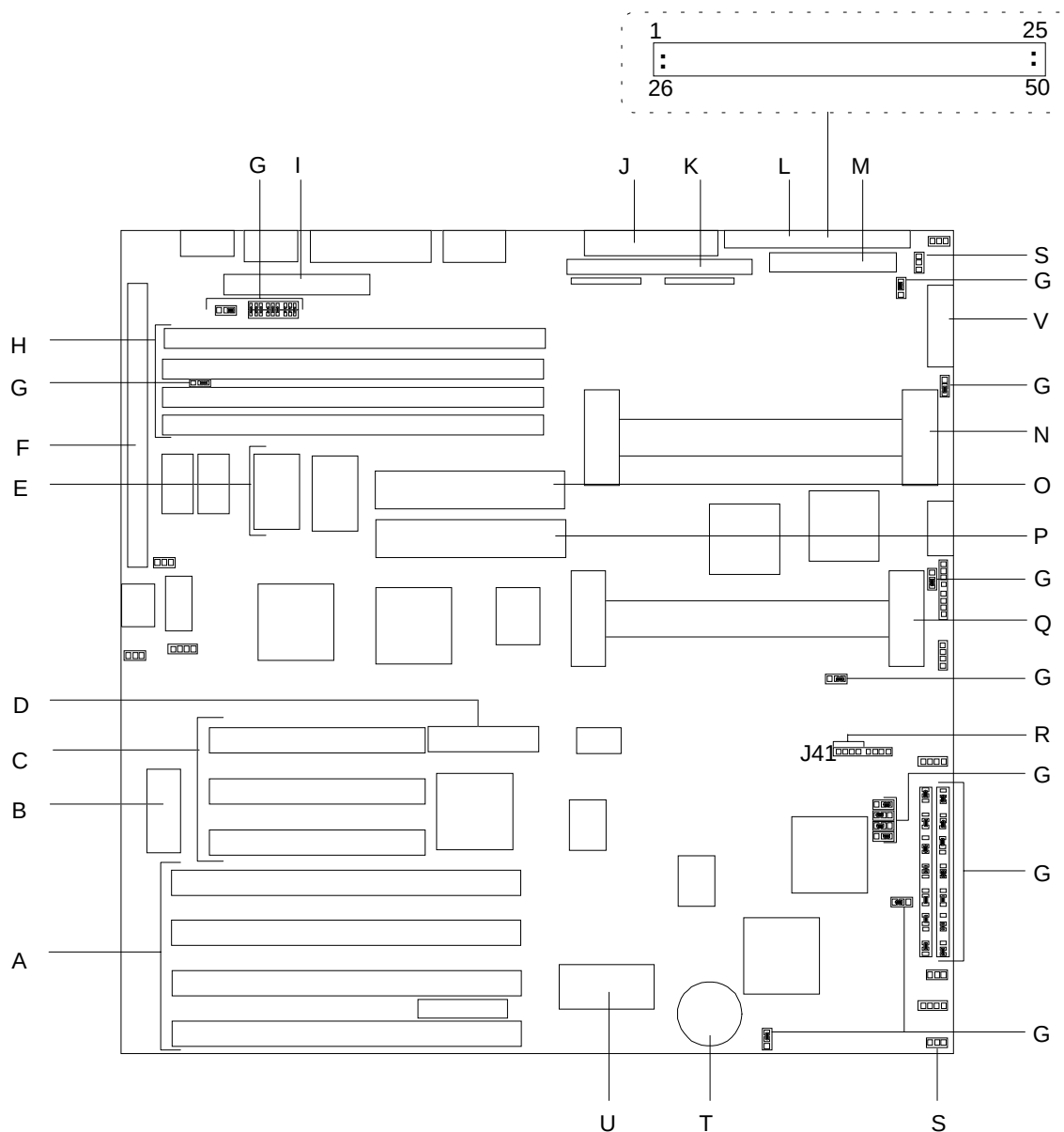


Figure 1-5. System Board Connector and Component Locations

- | | |
|-------------------------------------|---------------------------------------|
| A. ISA expansion slots | L. Front panel connector* |
| B. BIOS | M. Diskette connector |
| C. PCI expansion slots | N. CPU 2 (optional) |
| D. RAID connector (reserved) | O. Voltage Module 2 (optional) |
| E. Video DRAM sockets (2) | P. Voltage Module 1 |
| F. I/O riser board connector | Q. CPU 1 |
| G. Configuration jumpers | R. Speaker connector |
| H. DIMM Sockets (4) | S. Fan connector |
| I. IDE connector | T. Real time clock battery |
| J. Wide SCSI connector | U. Non-volatile memory |
| K. Narrow SCSI connector | V. Reserved |

*The front panel OFF/ON DC power button is connected to pins 6-31;
the front panel Reset button is connected to pins 7-32.

Pentium II Processor

Depending on system configuration, each system includes one or two Pentium II processors. Each Pentium II processor is packaged in a Single Edge Contact (SEC or SECC2) cartridge. The cartridge includes the processor core with an integrated 16 KB primary (L1) cache; the secondary (L2) cache; a thermal plate; and a back cover. The processor implements the MMX™ technology and the processor's numeric coprocessor significantly increases the speed of floating-point operations.

The processor external interface operates at a maximum of 66 MHz. The second-level cache is located on the substrate of the SEC cartridge. The cache includes burst pipelined synchronous static RAM (BSRAM) that operates at half the core clock rate. The L2 cache is offered in 512 KB configurations only, with error correcting code (ECC).

The system board contains four 168-pin DIMM sockets (Figure 1-5, H). The minimum system board configuration includes 32 MB of system memory. 4 DIMM sockets allow for system memory expansion to 512 MB. ECC generation/checking is provided for detection and correction of memory errors.

Note: Only use DIMMs approved for use in this server system. Call your customer service representative for information.

I/O Expansion Slots

The server's expansion capabilities meet the needs of file and application servers for high performance I/O by providing a combination of PCI local bus and ISA connectors. The system board offers two dedicated PCI slots, three dedicated ISA slots, and one shared PCI/ISA slot.

The system board contains four ISA I/O (input/output) expansion slots (Figure 1-5, A). The ISA architecture supports 16-bit memory addressing and 16-bit data transfers.

The system board also contains three PCI bus I/O expansion slots (Figure 1-5, C). The PCI architecture supports 32-bit memory addressing and 32-bit data transfers. One of these slots shares a common chassis I/O expansion slot with one of the ISA slots; if you use this slot as a PCI slot, you cannot use it as an ISA slot.

Real-Time Clock/Calendar

The real-time clock provides system clock/calendar information stored in a non-volatile memory (NVRAM). The real-time clock battery provides power backup for the real-time clock.

BIOS

A BIOS and Setup Utility are located in the Flash EPROM on the system board and include support for system setup and PCI/ISA Plug-and-Play auto-configuration. A number of security, reliability, and management features also have been incorporated to meet vital server needs.

IDE Controller

The system includes an IDE interface controller on the system board (Figure 1-5, I) supporting a master and slave device. This provides support for optional tape devices.

SCSI Controller

The system includes two onboard SCSI controllers, providing both ultra wide (Figure 2-3, J) and fast narrow (Figure 1-5, K) SCSI support.

The fast/narrow SCSI-2 controller (Adaptec® AIC-7860) supports data paths of 8-bit (fast/narrow SCSI) at a data transfer rate of 10 MB/sec and the ultra wide SCSI-2 controller (Adaptec® AIC-7880) supports data paths of 16-bit (fast/wide or ultra /wide SCSI) at a data transfer rate of 20 MB/sec or 40 MB/sec. On the PCI bus, these controllers support burst data transfer rates up to the maximum of 133 MB/sec. On this server, the ultra wide controller is cabled to the Ultra-2 SCSI backplane that supports up to seven Ultra-2 SCA drives. The fast narrow controller is cabled to the internally mounted CD-ROM drive and can also be cabled to the optional SCSI devices in the 5 1/4-inch removable media drive bays.

Video Controller

The system has a high-performance SVGA subsystem that supports the following:

- BIOS compatibility with VGA, EGA, CGA, Hercules Graphics, and MDA
- 2 MB of Video Random Access Memory (VRAM) video buffer
- 16-bit bus for high-speed display memory access
- Hardware accelerated bit block transfers (BITBLT)
- Display power management system
- Supports 72Hz refresh, non-interlaced at: 640x480, 800x600, 1024x768, or 1280x1024 resolutions
- Displays of up to 16M colors at 640x480 and 800x600 resolutions, 64K colors at 1024x768 resolutions and 256 colors at 1280x1024 resolutions.

Peripheral Controller

The advanced integrated peripheral controller supports two serial ports, one parallel port, diskette drive, PS/2-compatible keyboard and mouse, and integrated Real Time Clock (RTC). The system provides the connector interface for each port.

Serial Ports

Both serial ports are relocatable. Each serial port can be set to one of four different COM ports and can be enabled separately. When disabled, serial port interrupts are available to add-in boards.

Parallel Port

One IEEE 1284-compatible 25-pin bidirectional EPP (supporting levels 1.7 and 1.9) parallel port is provided. BIOS programming enables the parallel port and determines the port address and interrupt. When disabled, the interrupt is available to add-in boards.

External Device Connectors

The external I/O connectors provide support for a PS/2 compatible mouse and a keyboard, connectors for VGA monitor, 2 serial port connectors, and a parallel port connector.

System Security

The front panel of the tower-based system contains a mechanical lock to prevent access to the front of the computer chassis. In addition, each side cover contains a padlock loop (padlock not provided) located on the rear of the chassis to prevent removal of the side covers and access to the inside of the computer chassis

The computer chassis includes an intrusion switch for the front cover and interlock switches for both the left side and the right-side covers (as viewed from the front). When any these covers are opened, the switch transmits an alarm signal to the system board, where server management software processes the signal. The side cover switches also operate as interlock switches controlling power shut down to the system for safety reasons.

Security with the rack-mount system is identical to the tower-based system stated above, except that there is no front cover associated with the rack-mount system.

Software Locks via the BIOS Setup

The BIOS has software features that let you control access to one or more parts of the system:

- Set and enable an administrative password.
- Set and enable a user password.
- Enable password on boot.
- Disable writing to the diskette drive when secure mode is set.

2

Setting Up the System

- Overview
- Selecting a Site
- Unpacking the System
- Rack-Mount Subsystem Assembly
- Getting Familiar with the System
- Making Connections
- Setting the Line Voltage
- Connecting the Power Cord(s)
- Powering On Your System

Overview

This chapter describes how to select a site, unpack the system, make cable connections, and power on the tower-based or rack-mount system units. Also, provided are the instructions for assembling the rack-mount system unit.

Selecting a Site

The system operates reliably in a typical office environment. Choose a site that is:

- Near grounded, three-pronged power outlets.

 **Note:** For the United States and Canada, this means a NEMA 5-15R outlets for 100-120 VAC or NEMA 6-15R outlets for 200-240 VAC. For other international sites, this means three-pronged power outlets applicable for the electrical code of the region.



WARNING

Be sure the power service connection is through a properly grounded outlet.



CAUTION

When two power supplies are installed in the system the power plug from each of the power supplies must be plugged into the same common ground power outlets.

- Clean, dust-free, and well ventilated. Front and rear ventilating openings kept free of obstructions. Away from sources of heat, vibration or physical shock.
- Isolated from strong electromagnetic fields and electrical noise produced by electrical devices (such as air conditioners, large fans, large electric motors, radio and TV transmitters, and high-frequency security devices)
- Spacious enough to provide at least five inches (13 centimeters) behind the system and three inches (eight centimeters) on each side of the system for proper cooling, airflow, and cable clearance.
- Easily accessible for system maintenance and installation of system upgrades.

Unpacking the System

WARNING

Your system weighs approximately 65 pounds (29.25 kg). If your system contains numerous optional boards and peripheral devices, it will weigh more. To avoid personal injury, make sure you have someone help you lift or move the system.

When you receive your system, inspect the shipping containers prior to unpacking. If the shipping boxes are damaged, note the damage, and if possible, photograph it for reference. After removing the contents of the containers, keep the cartons and the packing materials. If the contents appear damaged when you unpack the boxes, file a damage claim with the carrier immediately.

Rack-Mount Subsystem Assembly

This section provides the instructions for assembling the rack-mount server unit into a standard EIA 19-inch rack cabinet.

Before You Begin

Before you begin, please review the following cautions, warnings, and general guidelines.

WARNING

Be sure that power to the system is turned off and unplugged. All voltage is removed only when the power cords are unplugged.

- Avoid excessive vibration and shock. Dropping an electronic component can cause serious damage.
- Do not disconnect or remove parts other than those specified in the procedure.
- Do not touch I/O connector pins.
- All screws are phillips-head, unless otherwise specified.
- On completion of any assembly or reassembly, perform a power-on test. If a fault occurs, verify that the assembly or reassembly was performed correctly. If the problem persists, see Chapter 5, Problem Solving".

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Assembly

This section describes how to assemble your rack-mount server unit into a standard EIA 19 inch rack cabinet.



CAUTION

Ensure that the location of the rack-mount server unit does not create an unstable condition when installed in the rack cabinet.

1. Select an appropriate location in your rack cabinet for the rack-mount server unit. To improve rack stability, mount heavier items towards the bottom of the rack cabinet.



Note: When planning your system configuration for the rack cabinet you should consider the length of the cables that interconnect system components.

2. Locate the two support brackets (D). Using four self tapping screws (E) supplied with the rack cabinet for each support bracket, attach the two support brackets to the vertical mounting rails (A and B) of the rack cabinet.
3. Install the four caged nuts (C) that secure the front of the rack-mount server unit to the rack cabinet. Position the caged nuts to align with the screw holes in the front bezel of the rack-mount server unit.



Note: The caged nuts are secured into the vertical mounting rails of the rack cabinet by inserting one side of the nut into the slot and squeeze while pressing the opposite side until it snaps into place.

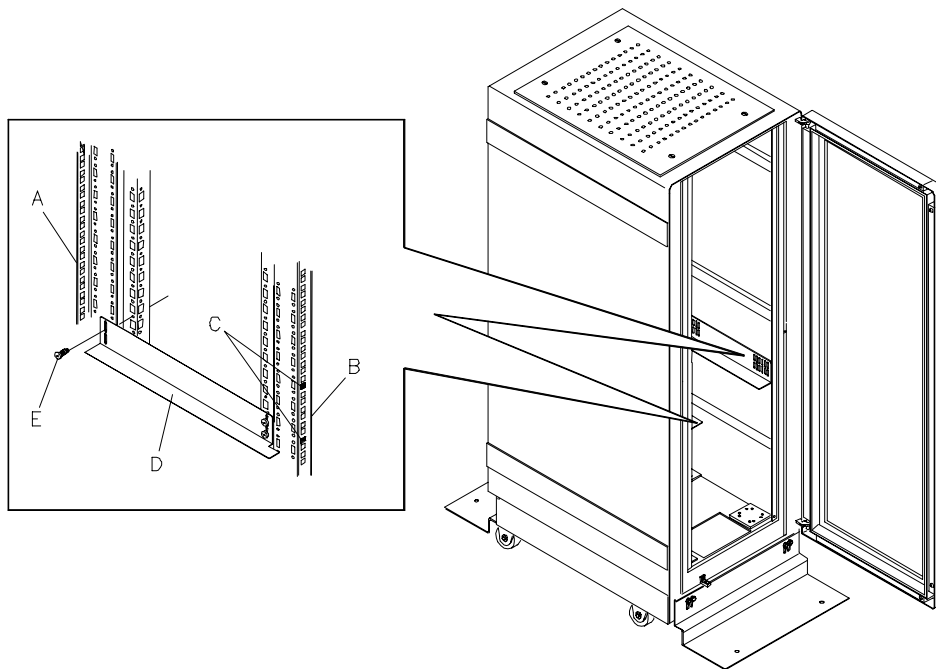


Figure 2-1 Assembling the Support Brackets in the Rack Cabinet

- A. Rear vertical mounting rail
- B. Front vertical mounting rail
- C. Four caged nuts
- D. Two support brackets
- E. Eight self-tapping screws

4. Lift the rack-mount server unit (C) onto the two support brackets and slide it toward the rear of the rack cabinet.

! WARNING

It is strongly recommended that two people are present when lifting and assembling the rack-mount server unit into a rack cabinet.

5. Secure the front bezel to the rack cabinet's front vertical mounting rails (B) using the four screws (E) and plastic washers (D) provided.

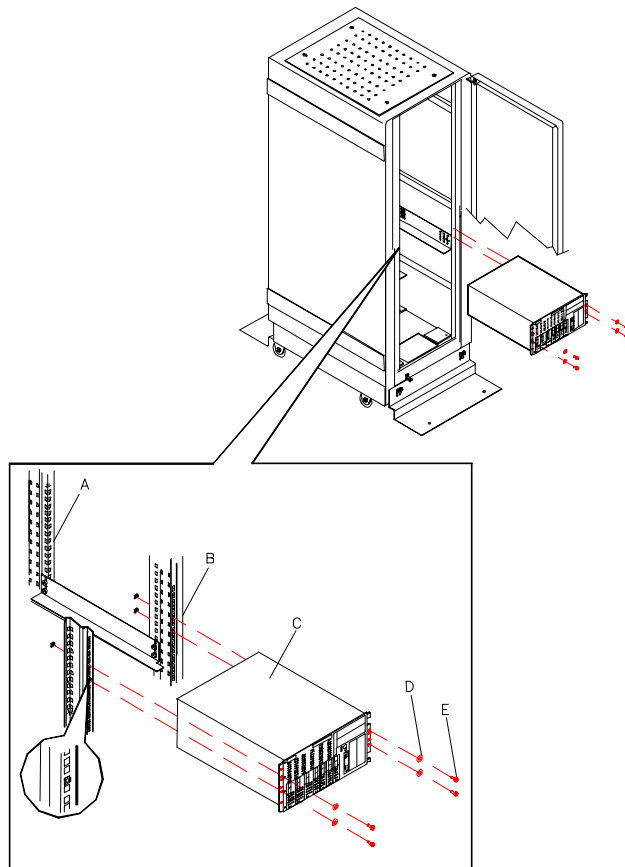


Figure 2-2 Installing the Rack-Mount Server Unit into the Rack Cabinet

- A. Rear vertical mounting rail
- B. Front vertical mounting rail
- C. Rack-mount server unit
- D. Four plastic washers
- E. Four screws

Getting Familiar with the System

Before setting up your system, you should become familiar with the system's features, such as the location of your system's front and rear panel switches, indicators and connectors, etc. Note that this section describes the tower-based system controls (switches and indicators) and connectors, which are identical for the rack-mount system.

Front View with Front Door Closed

This figure shows the location of the front system features (tower-based system only).

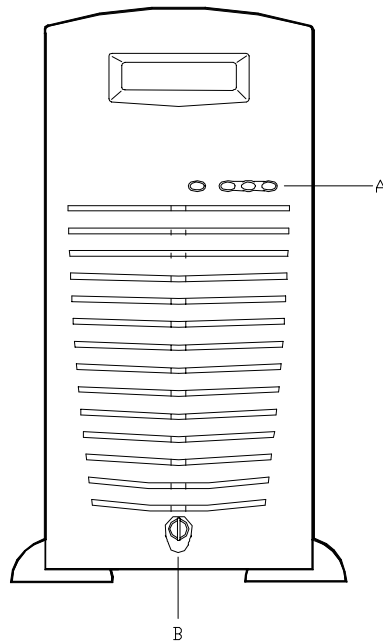


Figure 2-3 Front Features

- | | | |
|----|-------------------|---|
| A. | System indicators | (See "Front View with Front Door Opened" later in this chapter). |
| B. | Keylock | When locked, secures the front door not allowing access to the front system controls. |

Front View with Front Door Opened

Refer to the following figure and open the front door of the cabinet as follows (tower-based system only).

1. If door is locked, unlock the front door.
2. Pull the bottom of the front door out and tilt up until it is aligned level with the top of the cabinet, then push the door back directly over the top of the cabinet as far as it will go.

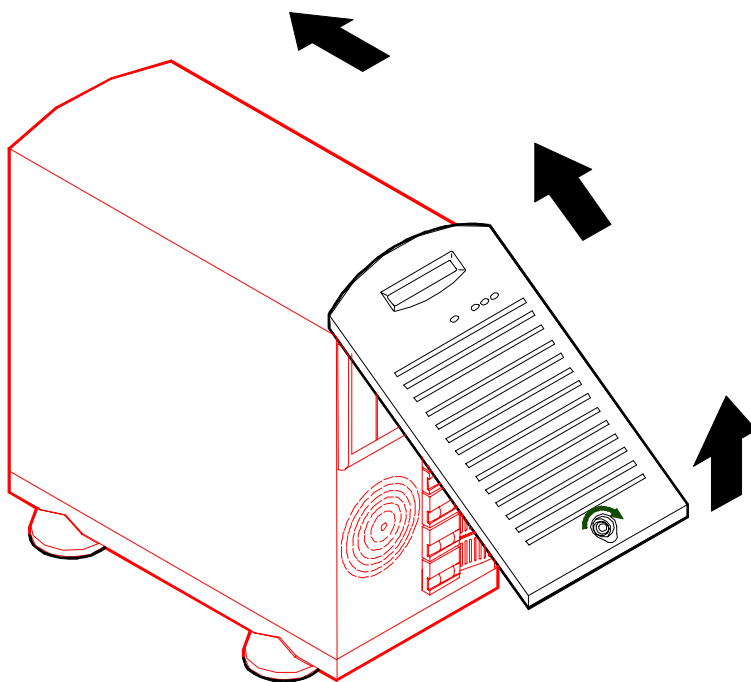


Figure 2-4 Opening the Front Door

This figure shows the location of the front system controls and indicators.

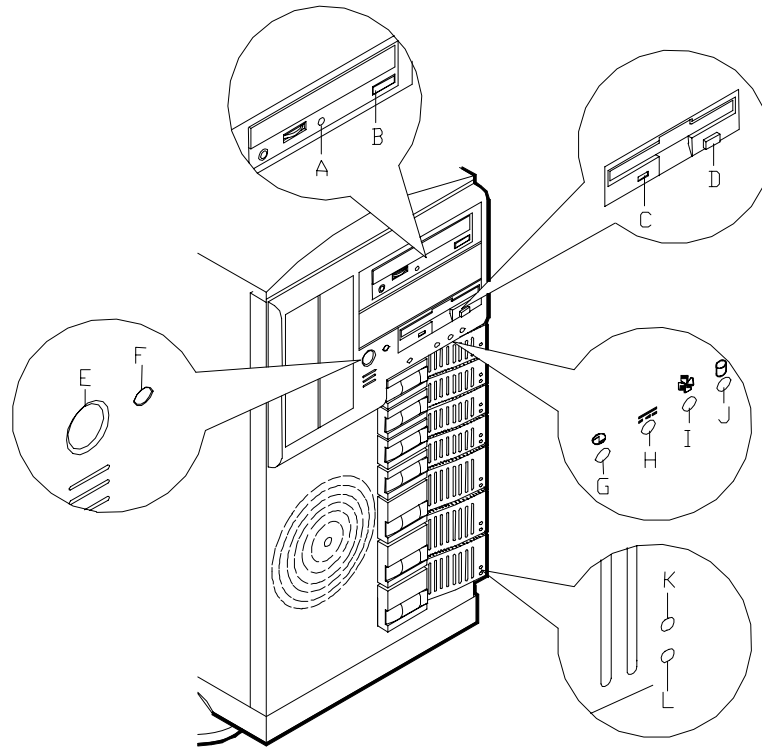


Figure 2-5 Front System Features and Controls

A.	Activity light, CD-ROM reader	When lit, CD-ROM reader is in use.
B.	Load/eject button, CD-ROM reader	Press to load CD and eject CD.
C.	Activity light, 3 ½-inch diskette drive	When lit, diskette is in use.
D.	Eject button, 3 ½-inch diskette drive	Press to eject diskette.
E.	DC power ON/OFF switch	Press to turn system DC power on or off.
F.	Reset switch	Press to reinitialize system.
G.	DC power ON/OFF	See table "Front System Status Indicator LEDs" that follow.
H.	Power alarm	See table "Front System Status Indicator LEDs" that follow.
I.	Fan alarm	See table "Front System Status Indicator LEDs" that follow.
J.	Array alarm	See table "Front System Status Indicator LEDs" that follow.
K.	Disk drive status LED	See table "Disk Drive Status Indicator LEDs" that follow.
L.	Disk drive activity LED	See table "Disk Drive Status Indicator LEDs" that follow.

Rear View

This figure shows the location of the following rear system features and controls.

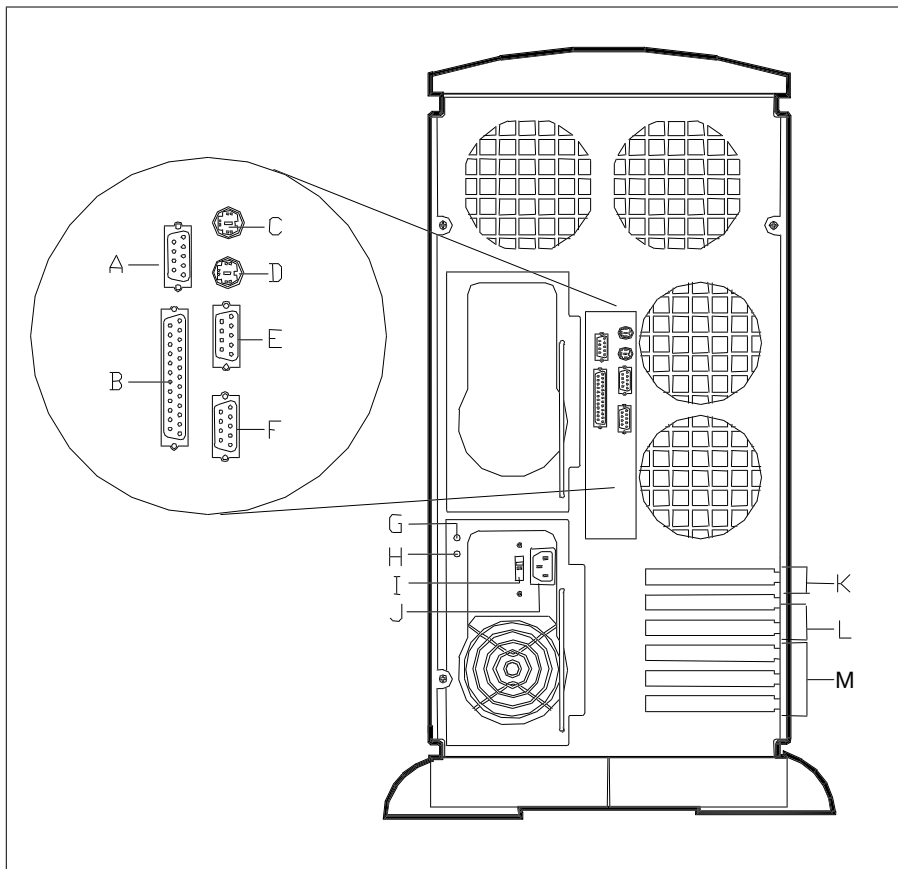


Figure 2-6 Rear Features and Controls

A.	COM1	COM1 serial port 9-pin connector.
B.	Printer	25-pin parallel port connector.
C.	Mouse	PS/2-compatible 6-pin mini-DIN connector.
D.	Keyboard	PS/2-compatible 6-pin mini-DIN connector.
E.	COM2	COM2 serial port 9-pin connector.
F.	VGA	VGA monitor 15-pin connector.
G.	Power Supply Status LED	See Table "Power Supply Status Indicator LEDs (Rear Panel)" that follows.
H.	DC Power Status LED	See Table "Power Supply Status Indicator LEDs (Rear Panel)" that follows.
I.	Line voltage selector switch	Selects AC input power of 115 VAC or 230 VAC.
J.	AC input power connector	Supplies AC power to the power supply.
K.	PCI slot	One PCI add-in board slot locations.
L.	Combo PCI/ISA slot	One PCI or ISA slot location.
M.	ISA slots	Three ISA add-in board slot locations.

Status Indicator LED Descriptions

The following tables list the System Status Indicator LEDs, the Disk Drive Status Indicator LEDs, the Disk Drive Status Abnormal Conditions, the Power Supply Status Indicator LEDs, and the LAN Status Indicator LEDs along with a description of each LED indicator.

Front System Status Indicator LEDs

LED	Status	Description	Response
DC Power ON/OFF	Off	DC power OFF	None required (normal)
	ON (Green)	DC power ON	None required (normal)
Power Alarm ¹	Off	Not active	None required (normal)
	ON (Amber)	Failure has occurred in one or more power supplies or system does not have second power supply installed. (see the "Power Supply Status Indicators" table DC Power Status "Amber" that follows.)	
Fan Alarm	Off	All fans operating normally	None required (normal)
	ON (Amber)	Fan failure	Replace fan in chassis or replace power supply
Array Alarm	Off	Always OFF unless RAID is installed	None required (normal)
	ON (Amber)	RAID Array failure	Replace disk drive with amber light.

¹Valid only when a second power supply is installed.

Power Supply Status Indicator LEDs (Rear Panel)

LED	Status	Description	Response
Power Supply Status	Off	AC Power not available	None required (normal)
	ON (Green)	AC Power supplied to power supply	None required (normal)
DC Power Status*	Off	No alarms	None required (normal)
	(Amber)	AC Power disconnected, power supply failed or system does not have second power supply installed.	Verify AC power is ON, reconnect AC power, or replace power supply,

*Connects to the Power Alarm light.

 **Note:** The Disk Drive Status Indicator LEDs are active only when a RAID board is installed.

Front Disk Drive Status Indicator LEDs

LED	Status	Description	Response
Disk Drive Activity	Off	Not accessing disk drive	None required (normal)
	ON (Green)	Accessing disk drive	None required (normal)
Disk Drive Status	Off	No alarms	None required (normal)
	ON (Amber)	(See the "Disk Drive Status Conditions" table that follows.)	

Disk Drive Status Conditions

Condition	LED
No Error	Off
Faulty or Rebuild Stopped	Steady ON
Rebuild	Slow Blink for approximately one second
Identify	Fast Blink for approximately three seconds
Predicted Fault	Four fast blinks, pause (repeats)
Hot Spare	Two fast blinks, pause (repeats)

Making Connections

If your system normally operates without a video display or keyboard (for example, as a network server), you must install a video display and keyboard to configure the system. You may remove them after running the Resource Configuration Utility (RCU).

Refer to the previous figure (Rear Features and Controls) and connect your keyboard, monitor, and mouse. Connect any external peripheral devices such as a printer or modem by following the instructions included with these devices.



CAUTION

Damage to the system may result if the keyboard/mouse cable is inserted or removed when power is applied to the system.

Inserting a telephone line connector into a LAN board RJ-45 port may result in personal injury and equipment damage.

Setting the Line Voltage

The system contains an ATX300 watt power supply that is switch-selectable for 115 or 230 VAC at an operating frequency of 50/60Hz. The power supply voltage selection switch is factory set to 115Vac for systems shipped to North America; it is set to 230Vac for systems shipped in Europe. Line source voltages between 200 and 240 VAC are acceptable when the power supply input voltage is set to 230 VAC.



CAUTION

Before you plug the system power cord into an AC outlet, ensure the input line voltage setting for the power supply is correct.

To use the system with line source voltages between 200 and 240 VAC, the line voltage selector switch on the power supply must be set to 230. If you set the switch to the 115 VAC position, the power supply will be damaged when you plug in your system.

When two power supplies are installed in the system both power supplies must have their line voltage selector switch set to the same voltage.

If you need to change the line voltage setting, perform the following steps.



Note: If you are setting up your system for the first time, the power cord will not be connected to the rear panel of your system.

1. Unplug the AC power cord from the back of the chassis.
2. Insert the tip of a small screwdriver or ballpoint pen into the depression on the line voltage selector.
3. Slide the selector switch to the left for 115 VAC or to the right for 230 VAC (line source voltage range: 220 to 240 VAC).

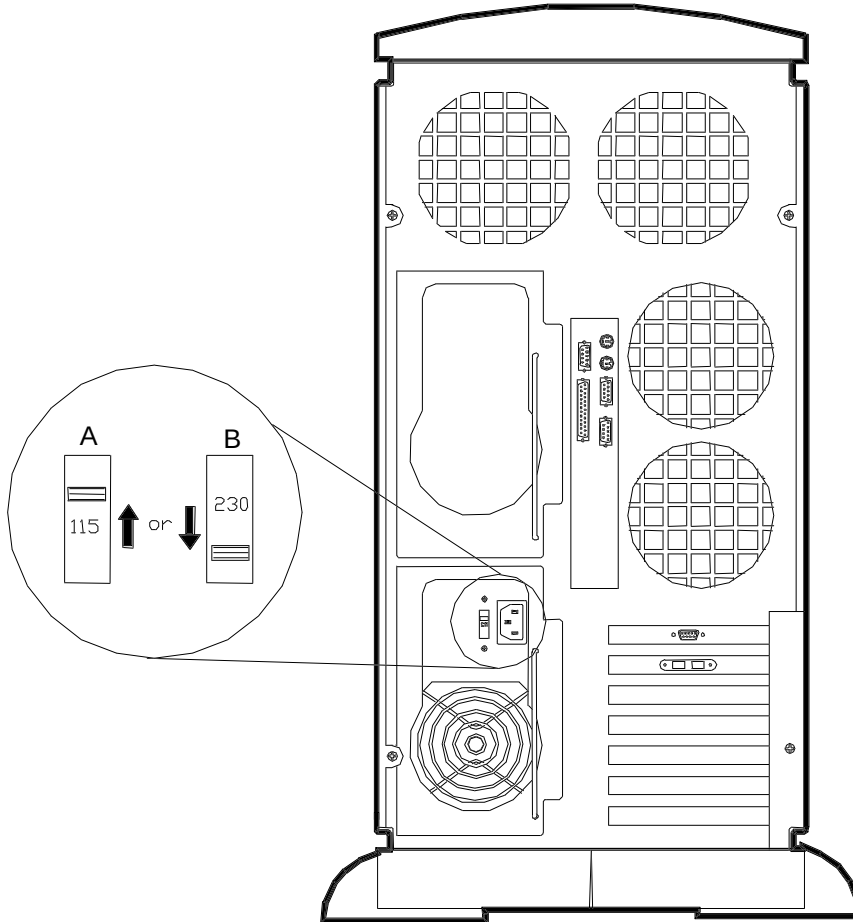


Figure 2-7 Setting the Line Voltage

- A. Voltage selector switch set to 115 VAC
- B. Voltage selector switch set to 230 VAC

Connecting the Power Cord(s)

Plug the female end of the AC power cord into the input receptacle on the rear of the power supply cage. Plug the male end of the power cord into NEMA 5-15R outlet for 100-120 VAC or NEMA 6-15R outlet for 200-240 VAC.

If the power cord(s) supplied with the system are not compatible with the AC wall outlet in your region, obtain a suitable power cord that meets the following criteria.

- The power cord must be rated for the available AC voltage and have a current rating that is at least 125% of the current rating of the system.
- The power cord connector that plugs into the wall outlet must be terminated in a grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.
- The power cord connector that plugs into the system must be an IEC- type CEE-22 female connector.
- The power cord must be less than 1.8 meters (6.0 feet) long.



WARNING

Your system shipped with a power cord for each power supply. Do not attempt to modify or use the supplied AC power cord if it is not the exact type required.



CAUTION

When two power supplies are installed in the system the power plug from each of the power supplies must be plugged into the same common ground power outlets.

Powering On Your System

Power on your system as follows.

1. Make sure all external devices, such as a video display, keyboard, and mouse (optional) have been connected, and the power cords are connected.
2. Power on the video display and any other external devices.
3. Press the push-button power on/off switch on the front panel. Verify that the system power-on LED is lit. If it is not lit, ensure the ac power cords are connected to a functional ac power source.

After a few seconds your system begins the internal Power-On Self Tests (POST). POST automatically checks the system board, CPU module, memory, keyboard, and most installed peripheral devices.



CAUTION

Always allow POST to complete before powering down your system.

If you have problems powering on your system, refer to Chapter 5, Problem Solving.

After you have successfully powered on your system, insert the EXPRESSBUILDER CD-ROM into the CD-ROM device, reboot the system and follow the screen prompts to run EXPRESSBUILDER.

3

Configuring Your System

- Overview
- Resource Configuration Utility (RCU)
- BIOS Setup Utility
- Using the Utilities Diskette
- Optionals RAID Controllers
- Configuring System Board Jumpers

Overview

Configuration and setup utilities are used to change your system configuration. You can configure your system, as well as option boards you may add to your system, using the Resource Configuration Utility (RCU) diskette. Also, several unique system parameters are configured using BIOS Setup which is stored in the system FLASH memory. A diskette is not needed to run BIOS Setup.

A Utilities diskette contains the SCSISelect Utility and the Event Log Utility. The Event Log Utility is used to read stored system event information. The SCSISelect Utility is used if you need to configure the SCSI controller in your system or to perform a SCSI disk format or verify disk operation of these drives.

If your system has been factory configured, the RCU, BIOS Setup, or SCSISelect utilities do not need to be run unless you want to change the password or security features, add option boards or devices, or upgrade your system board.

There are some system configuration parameters that are set by jumpers on the system board. However, these parameters do not usually require change.

This chapter provides procedures for running the RCU, BIOS Setup, and the Utilities diskette. Several configuration tables are provided in this chapter to record changes you make to the default system configuration.

You use the EXPRESSBUILDER CD-ROM to create the RCU and Utilities diskettes.

Resource Configuration Utility (RCU)

The Resource Configuration Utility is used to configure your system. The RCU can be used to configure the memory subsystem, peripheral device subsystems, and interface adapters. RCU recognizes ISA Plug-and-Play boards and PCI boards and displays their configuration. ISA (non-Plug and Play) adapter boards must be added to the RCU configuration to reserve the resources required by the ISA boards.

After you add options using the RCU, the system automatically configures and initializes them during system initialization at boot up.

The RCU stores the configuration information in the non-volatile memory on your system. When you exit the RCU the configuration information is written to non-volatile memory. The RCU also maintains the Setup configuration, which is stored in the battery-backed memory. This means that when you exit the RCU, the Setup and RCU configuration will agree with each other.

Using the RCU

If you are adding a non-Plug and Play ISA option board, run the RCU before installing the board using procedures found in Chapter 4, Upgrading Your System. If you are upgrading system memory, do so before running the RCU using procedures found in the Chapter 4 of this guide. To use the RCU:



Note: The system can fail following improper configuration. Always save the current settings before reconfiguring the system.

 **Note:** Because of license restrictions, the RCU diskette, as created by the EXPRESSBUILDER CD-ROM, is not bootable. In order to use this diskette, you must make it bootable.

1. Power on the system.
2. If the diskette drive is disabled, enable it using the BIOS Setup utility, explained later in this chapter. Specify the correct type of diskette drive.
3. Using the EXPRESSBUILDER CD-ROM, create the RCU diskette. Note that the CD-ROM refers to the RCU as the SCU.

 **Note:** Perform Step 4 of this procedure the first time you use the RCU diskette. This step enables the RCU diskette to be MS-DOS bootable.

4. Insert the RCU diskette into floppy disk drive A. At the C:\ prompt type:
SYS A:

Press ENTER. MS-DOS system files are copied onto the diskette. Your RCU diskette is now bootable.
5. Start the RCU by rebooting the system, with the RCU diskette in Drive A. When the RCU banner is displayed, press ENTER and the System Configuration Utility Main Menu shown in Table 3-1 is displayed.

Table 3-1. Resource Configuration Utility Main Menu

MENU OPTIONS	DESCRIPTION
Learn about configuring your computer	Provides basic instructions on resource configuration and using the Help program.
Configure computer	Lists automatically detected boards, and enables manually adding, moving and removing boards. Plug-and-Play boards don't require configuration files. If you ISA boards which require configuration files, use "Add or remove boards" for a menu to enter or change ISA board configurations. (Refer to <i>ISA Board Configuration</i> , page 3-5. INSERT adds a board not detected or has not been installed. DEL removes a selected board. F7 moves a selected board to a different slot.
Set date	Enables viewing and changing the date that the computer uses.
Set time	Enables viewing and changing the time that the computer uses.
Maintain system configuration diskette	Enables viewing and changing Configuration (.CFG) files and System Configuration Information (SCI) files.
Exit from this utility	Exits from the RCU.

6. Select *Learn about configuring your computer* from the RCU Main Menu and press ENTER if you need information on system configuration. Read through the information and press the F10 key when you are done.

7. Using the Up and Down arrows, highlight *Configure Computer* and press ENTER. The Resource Configuration Utility Menu shown in Table 3-2 displays. The keys that are active while viewing a screen, are displayed on the bottom of the screen.



Note: Press the F1 key at any time for help and additional information on each option. To return from help, press the ESC key.

8. Select Step 1: Important Resource Configuration information and press ENTER to learn more about the Resource Configuration Utility.
9. Select Step 2 to add an ISA board to your system. Refer to “ISA Board Configuration”, page 3-5.

Table 3-2. Resource Configuration Utility Menu

MENU OPTIONS	DESCRIPTION
Step 1. Important Resource configuration information.	Provides information on the Resource Configuration program and how it differs from ISA board configuration.
Step 2. Add or remove boards	Lists automatically detected boards, and enables manually adding, moving and removing boards. Plug-and-Play boards don't require configuration files. This list shows all the boards and options that will be installed in your system.
Step 3. View or Edit Details	Enables viewing and changing your system configuration settings including embedded features, functionality, IRQs, and port selections. Perform Step 3 only if you need to change the system default settings.
Step 4. Examine Switches or Print Report	Enables viewing the required switch and jumper settings and allows printing of a configuration report.
Step 5. Save and Exit	Allows you to save your configuration and exits to the operating system. You can also exit without saving.

10. Select Step 3 to view your systems configuration settings. The normal (default) RCU settings are shown in Table 3-3.

RCU Configuration Settings

Table 3-3 shows the recommended RCU settings for a sample system and provides a place for you to record any changes you make to the settings. To display the configuration settings, select Step 3 under the Resource Configuration Utility Menu. To edit any of the configuration parameters, use the UP and DOWN arrows to highlight the desired configuration parameter and press ENTER. Pressing F6 at this point, allows you to edit any of the parameters resources (IRQs, DMAs, I/O ports or memory).

Table 3-3. RCU Configurations

MAIN MENU	NORMAL SETTING	YOUR CONFIGURATION
System Board		
Mouse Controller	Enabled	
RS - 232 COMM Port 1	PORT 3F8h - 3FFh IRQ 4	
RS - 232 COMM Port 2	PORT 2F8h - 2FFh IRQ 3	
Parallel Port	PORT 378h - 37Fh IRQ 7	

MAIN MENU	NORMAL SETTING	YOUR CONFIGURATION
IDE Controller	Enabled	
Floppy Controller	Enabled	
SLOT 1 - PCI Ethernet Controller PCI Function 1	Enabled	
Embedded - PCI SCSI Controller PCI Function 1	Enabled	
Embedded - PCI SCSI Controller PCI Function 1	Enabled	
Embedded - PCI VGA Controller PCI Function 1	Enabled	
Standard VGA Resources	Enabled	

ISA Board Configuration

If you want to add a non-Plug and Play ISA board to your system that is not included in a .cfg file, use the following procedures to define and add the option board. It is necessary to define an ISA board to prevent other boards in the system from using the same IRQ levels, DMA channels, I/O port addresses, or memory addresses, that your ISA board uses.

You must run the RCU and add the ISA board to the configuration before installing the ISA board in the system, otherwise the resources on the ISA board may conflict with a Plug-and-Plug board in the system.

BIOS automatically assigns ISA Plug-and-Plug boards to the next available slot. If the slot displayed in Step 2: “Add or Remove Boards” is not the actual slot, it can be moved by using the F7 function key.



Note: IRQ levels, DMA channels, I/O port addresses, and memory addresses defined using this procedure should reflect the same settings defined by supplied jumpers and/or configuration documents.

1. Insert the RCU diskette into drive A: and power-on the system. The system boots-up using the RCU diskette.
2. The RCU Main Menu shown in Table 3-1 is displayed. At the Startup Menu, enter choice 2, *Configure Computer*.
3. The Resource Configuration Utility Menu shown in Table 3-2 is displayed. Select Step 2 *Add or Remove Boards* and press ENTER.
4. The *Step 2: Add or remove boards* screen is displayed. At this screen select *Add* by pressing INSERT.
5. The *Add* screen is displayed telling you to locate the diskette that contains the .cfg file for the board. Press ENTER at this screen.
6. The *Select a Configuration (CFG) file to add* screen is displayed. At this screen select *Not Listed* by pressing F5.

7. The *Add a board without a .cfg file* screen is displayed. Read through the information and press ENTER. The *Add a board without a .cfg file* screen reappears. When the screen reappears select *Create .cfg file* and press ENTER.
8. The *Create A Board CFG File* screen is displayed. At this screen enter the board description and manufacturer and press ENTER.
9. The *New Board Setup* screen is displayed. Using the scrollable list select the resources used by the new ISA board. Table 3-4 provides a place for you to record the configuration you assign to the board.
10. Press F10 when you are finished selecting the resources used by the new ISA board.
11. The *View Current Settings* screen is displayed. Press ENTER to save the current settings.
12. The *Add confirmation* screen is displayed. Review the manufacturer's comments and press ENTER.

Table 3-4. ISA Board Configurations

ISA BOARD DEFINITIONS	YOUR CONFIGURATION
Board Description:	
Manufacturer:	
Interrupts (Select from scrollable list)	
DMA Channels (Select from scrollable list)	
Port address	
Start	
End	
Memory address	
Start	
Length	
Slot	

13. The *Add* screen is displayed. Select the slot in which you want to install the board and press ENTER.

 **Note:** If the board you add causes a conflict in the configuration, a Caution message is displayed. Press ENTER at the message. This leads you to the screens that allow you to resolve the conflict.

14. The *Step 2: Add or remove boards* screen is displayed. At this screen select *Done* by pressing F10.
15. The *Steps in configuring your computer* screen is displayed. At this screen select "Step 4: Examine switches or print report" and press ENTER.
16. The *Step 4: Examine switches or print report* screen is displayed. The boards marked with an arrow indicate that the boards in your system may have jumpers and switches that you must physically verify or that a software statement with additional information about the board is provided. Select *Done* by pressing F10.

 **Note:** If the ISA board you are adding to the configuration does not have switches, jumpers, software statements or connection information, an Information message appears on screen. Press ENTER and proceed to the next step.

17. The *Steps in configuring your computer* screen is displayed. At this screen select “Step 5: Save and exit” and press ENTER.
18. The *Save and exit* screen is displayed. At this screen select “Save the configuration and restart the computer” and press ENTER.
19. The *Reboot* screen is displayed. At this screen press ENTER.
20. Now that you have reserved the system resources, you can install the ISA board.

BIOS Setup Utility

The BIOS Setup Utility, like the RCU, is used to change system configuration parameters. This utility has some unique parameters and many parameters that are also configurable with the RCU. The utility is resident in the system FLASH memory and does not require a diskette or an operating system present to run. However, parameters set with the BIOS Setup Utility that can also be set with the RCU, will be overwritten by the RCU the next time the RCU is run.

Using the BIOS Setup Utility

You access the BIOS Setup utility when you turn on or reboot your system. To run the BIOS Setup Utility, perform the following procedure:

1. Power-on or reboot the system. BIOS displays the following:
Press <F2> to enter SETUP
2. Press **F2**. The BIOS Setup Utility starts and the Main Menu is displayed. The menu bar at the top of the Main Menu lists the following selections:

Menu	Use
Main	Use this menu for basic system configuration.
Advanced	Use this menu for setting the Advanced Features available on your system.
Security	Use this menu to set User and Supervisor Passwords and the Backup and Virus-Check reminders.
Server	Use this menu for configuring Server Features.
Exit	Exits the current menu.

Use the arrow keys to select a menu or an item on a displayed menu. Press the value keys (listed in the table below) to cycle through the allowable values for the selected field. Use the Exit menu’s “Save Values” selection to save the current values on all the menus.

To display a submenu, position the cursor on a selection that has a submenu and press ENTER. Selections with submenus are preceded by an arrow.

Refer to the following table for information on the keys you use with Setup. These keys are also listed at the bottom of the Setup menu.

Key	Function in Setup Menu
F1 or Alt-H	General Help window.
ESC	Exit the current menu.
Left or Right arrow keys	Select a different menu.
Up or Down arrow keys	Move cursor up and down. The cursor moves only to the settings that you can change.
TAB or SHIFT-TAB	Cycle cursor up and down.
HOME or END	Move cursor to top or bottom of window.
PAGE UP or PAGE DOWN	Move cursor to next or previous page.
F5 or -	Select the previous value for the field.
F6 or + or SPACE	Select the next value for the field.
F9	Load default configuration values for this menu.
F10	Load previous configuration values for this menu.
ENTER	Execute command or Select ➤ submenu.
ALT-R	Refresh the screen.

BIOS Setup Configuration Settings

Table 3-5 shows the normal settings for the BIOS Setup Utility and provides a place for you to record any changes you make to these settings.

Table 3-5. BIOS Setup Configurations

MENU PARAMETER NAME	NORMAL SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
MAIN MENU		
System Time Enter current time (hour, minutes, seconds on 24 hour clock).	Current Time	
System Date Enter current date.	Current Date	
Language Use +/- to change values; indicates the language used by Setup.	English	
*Diskette A: Use +/- to change values; indicates the type of diskette drive installed.	1.44MB, 3 1/2"	
*Diskette B: Use +/- to change values; indicates the type of diskette drive installed.	Not Installed	

MENU PARAMETER NAME	NORMAL SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
**IDE Adapter 0 Master	None	
**IDE Adapter 0 Slave	None	
Video System	VGA	
MAIN MENU		
Memory Cache Press ENTER for menu.		
Memory Cache	Enabled	
Cache System BIOS Area	Write Protect	
Cache Video BIOS Area	Write Protect	
Cache Base 0 – 512K	Write Back	
Cache Base 512K – 640K	Write Back	
CacheExtended Memory Area	Write Back	
*Cache Memory Regions		
Cache C800-CBFF	Uncached	
Cache CC00-CFFF	Uncached	
Cache D000-D3FF	Uncached	
Cache D400-D7FF	Uncached	
Cache D800-DBFF	Uncached	
Cache DC00-DFFF	Uncached	
Memory Shadow Press ENTER for menu.		
System Shadow	Enabled	
Video Shadow	Enabled	
*Regions with Legacy Expansion ROMs		
Boot Sequence Press ENTER for menu.	A: then C:	
Boot Sequence	A: then C:	
SETUP Prompt	Enabled	
POST Errors	Enabled	
Floppy Check	Disabled	
Numlock Press ENTER for menu.	On	
Numlock	On	
Key Click	Disabled	
Key Board auto-repeat rate	30/sec	
Key Board auto-repeat delay	½ sec	
Base Memory:	640 KB	
Extended Memory:	127 MB	
ADVANCED MENU		
Integrated Peripherals Press ENTER for menu.		
*Serial Port 1	3F8, IRQ 4	

MENU PARAMETER NAME	NORMAL SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
*Serial Port 2	2F8, IRQ 3	
*Parallel Port	378, IRQ 7	
Parallel Mode	Bi-directional	
Diskette Controller	Enabled	
IDE Adapter	Enabled	
Mouse	Enabled	
Memory Reconfiguration Press ENTER for menu.		
Memory Reconfiguration	Enabled	
DIMM J20 – Row #1 Status	Normal	
Row #2 Status	None	
DIMM J19 – Row #3 Status	None	
Row #4 Status	None	
DIMM J18 – Row #5 Status	None	
Row #6 Status	None	
DIMM J17 – Row #7 Status	None	
Row #8 Status	None	
Memory Row Errors Clear	Press ENTER	
Memory Configuration Message	Enabled	
Memory Warning POST Error	Enabled	
CPU Reconfiguration Press ENTER for menu.		
CPU Reconfigure	Enabled	
CPU #1 Status	Normal	
CPU #2 Status	None	
Clear CPU Errors	Press ENTER	
CPU Error Pause	Enable	
**SMB Configuration Press ENTER for menu.		
ITF Monitoring Observation	OptROM – END	
Boot Monitoring	Disabled	
Boot Monitoring timeout period	5	
Advanced Chipset Control Press ENTER for menu.		
DRAM Speed	60ns	
DMA Aliasing	Enabled	
8-bit I/O Recovery	4.5	
16 bit I/O Recovery	4.5	
Use Mutiprocessor Specification	1.4	
Plug & Play O/S	No	

MENU PARAMETER NAME	NORMAL SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
Reset Configuration Data	No	
Pentium II BIOS Update	Enabled	
SECURITY MENU		
Supervisor Password is:	Disabled	
User Password is:	Disabled	
*Set Supervisor Password	Press ENTER.	
Set User Password	Press ENTER.	
***Password on boot	Disabled	
***Diskette Write	Normal	
***Diskette access	Supervisor	
System backup reminder	Disabled	
Execute User ROM	Disabled	
Allow SCSI Select	Enabled	
Power Switch Mask	Unmasked	
SERVER MENU		
Thermal Sensor Press ENTER for menu.		
Thermal Sensor	Enabled	
Upper Limit	55	
Lower Limit	7	
ESM ASIC Interrupt	IRQ 13	
SMI	Enabled	
Event Log Initialization	Disabled	
Clear Event Log	No	
Console Redirect Port	Disabled	

Ταβλε 3– . This parameter is overwritten by the RCU setting.

** BIOS does not display the attached slave (tape) device, only the master (CD-ROM) is reported.

*** These parameters require prior setting of supervisor password.

Note: Enabling supervisor password requires a password for entering SETUP.

Exiting BIOS Setup

To exit Setup, select Exit from the menu bar to display the Exit Setup menu.

The following table describes the options on this menu. Note that ESC does not exit this menu. You must select one of the items from the menu or menu bar to exit this menu.

SELECTION	DESCRIPTION
Save changes and Exit	Stores the selections displayed in the menus in CMOS and exits the Setup program.
Exit without Saving Changes	Exits the program without saving any changes you have made in this session. Previous selections remain in effect.
Get Default Values	Displays default values for all Setup menus. Useful if BIOS detects a problem with the values stored in CMOS.
Load Previous Values	Reverts to previously saved values if the new values have not been saved to CMOS.
Save Changes	Stores the current selections without exiting the Setup program.

Using the Utilities Diskette

The utilities diskette contains the SCSISelect Utility and an Event Log Reader Utility.



Note: Because of license restrictions, the Utilities diskette, as created by the EXPRESSBUILDER CD-ROM, is not bootable. In order to use this diskette, you must make it bootable.

To run the Utilities diskette, perform the following procedure:



Note: Perform Step 2 of this procedure the first time you use the utilities diskette. This step enables the diskette to be MS-DOS bootable.

1. Using the EXPRESSBUILDER CD-ROM, create the Utilities diskette.
2. Insert the Utilities diskette into floppy disk drive A. At the C:\prompt type:
SYS A:

Press ENTER. MS-DOS system files are copied onto the diskette. Your Utilities diskette is now bootable.
3. Reboot the system with the Utilities diskette in Drive A.
4. The MS-DOS Startup Menu displays. See Table 3-6.

Table 3-6. MS-DOS Startup Menu

MENU OPTIONS		DESCRIPTION
1.	Read the System Event Log.	Executes the Log Display Utility which displays any events stored in the system log area.
2.	Execute AIC-78xx SCSISelect Utility.	Loads the SCSISelect Utility and displays the current configurations.
3.	Exit to DOS.	Exits Utilities and returns to A: prompt.

Viewing the Event Log

The system Event Log Utility displays information on the events stored in the system log area. The information stored includes the name of the event, the date and time the event occurred and data pertinent to the event. Event data may include POST error codes that reflect hardware errors or software conflicts within the system.

 **Note:** Refer to Chapter 5 *Problem Solving* for definitions on all POST error codes.

To view the Event Log, perform the following procedure:

1. Insert the bootable Utilities diskette into floppy disk drive A.
2. Power-on the system. The system boots up.
3. The MS-DOS Startup Menu displays. See Table 3-6.
4. Select *1. Read the System Event Log* from the MS-DOS Startup Menu.
5. The System Event Log Utility starts. The System Event Log Utility screen is displayed. The following screen choices are available.

SCREEN	DESCRIPTION
File	Saves the Event Log and System information to a file.
ElogInfo	Displays Event Log information such as: date, time, and number of times the log was erased; major and minor revision level; and amount of memory used by the event log.
SystemInfo	Displays system information such as: system model; processor type and speed; ROM, SCSI and video BIOS version; number of ISA and PCI slots; total system memory size; and serial and parallel port configuration.
Event log	Displays the Event Log data.
Clear Event log	Clears the Event Log data.
Help	Description of information in this table.

Exit	Exits the System Event Log Utility.
-------------	-------------------------------------

To select an option from the System Event Log Utility screen, use ← and → to highlight the item and press ENTER.

To exit the menu item, press ESC.

SCSISelect Utility

Your system board includes two integrated SCSI host controllers used to manage SCSI devices in your system. The AIC7880 ultra wide SCSI controller provides support for seven internally mounted ultra/wide hard disk drives. The AIC7860 narrow SCSI controller provides support for internally mounted optional devices including a SCSI CD-ROM drive.

The integrated SCSI host controller is configured using the SCSISelect utility. Use the SCSISelect utility to:

- Change the SCSI host adapters default values.
- Check and/or change SCSI device settings for a particular device.
- Change the maximum SCSI bus transfer rate.
- Perform low-level formatting on SCSI disk devices.
- Perform verify operations on SCSI disk devices.

When disabling access to the SCSISelect Utility, the SCSISelect utility should be used in conjunction with the BIOS Setup utility. Changing the BIOS Setup utility “Allow SCSI Select” parameter to Disabled prevents the use of the SCSI Select utility via Ctrl-A, but the “Press <Ctrl-A> for SCSI Select” prompt is still displayed. Changing the SCSISelect utility “Display <Ctrl-A> Message During BIOS Initialization” parameter to Disabled prevents the prompt from being displayed. In combination these parameters can be used to prevent access to the SCSISelect utility during boot.

Using the SCSISelect Utility

To run the SCSISelect Utility, perform the following procedure:

1. Insert the bootable Utilities diskette into floppy disk drive A.
2. Power-on the system. The system boots up.
3. The MS-DOS Startup Menu displays. See Table 3-6.
4. Select 2. *Execute AIC-78xx SCSISelect Utility* from the MS-DOS Startup Menu. The SCSISelect Utility starts. When SCSISelect detects more than one AIC-78xx host adapters, it displays a selection menu listing the bus and device number of each adapter. When the selection menu appears, select the channel you wish to configure as follows:

Bus : Device	Selected SCSI Adapter
00 : 08h	AIC7880

00 : 0Bh	AIC7860
----------	---------

5. Once you select the adapter, the following screen is displayed:

SCREEN	DESCRIPTION
Configure/View Host Adapter Settings	Configure host adapter and device settings.
SCSI Disk Utilities	The utility scans the SCSI bus for SCSI devices, reports a description of each device. Run these utilities <i>before</i> configuring SCSI devices.

6. If you wish to format a disk, verify disk media, or display a list of devices and their SCSI IDs, select “SCSI Disk Utilities”. If you wish to configure the adapter or a device, select “Configure/View Host Adapter Settings”.

SCSISelect Configuration Settings

The following keys are active for all SCSISelect screens:

KEY	ACTION
Arrows	Up and down arrows move from one parameter to another within a screen.
ENTER	Displays options for a configurable parameter. Selects an option.
ESC	Moves back to previous screen or parameter or EXIT if at the Main menu.
F5	Switches between color and monochrome.
F6	Resets to host adapter defaults.

Table 3-7 shows the normal settings for the SCSISelect Utility and provides a place for you to record any changes you make to these settings.

Table 3-7. SCSISelect Setup Configurations

OPTION	RECOMMENDED SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
SCSI Bus Interface Definitions		
Host Adapter SCSI ID	7	
SCSI Parity Checking	Enabled	
Host Adapter SCSI Termination	Enabled	
Additional Options		
Boot Device Options	Press ENTER for menu	
Boot Target ID	0	
Boot LUN Number	0	
SCSI Device Configuration	Press ENTER for menu	
Initiate Sync Negotiation	Yes	
Maximum Sync Transfer Rate	40.0 ⁴	
Enable Disconnection	Yes	
Initiate Wide Negotiation	Yes	
Send Start Unit Command	Yes ¹	
BIOS Multiple LUN Support	no ¹	
Include in BIOS Scan	Yes ¹	

¹ No effect if BIOS is disabled.

⁴ Set to 40.0 for AIC7880 or 10.0 for AIC7860.

Table 3-7. SCSISelect Setup Configurations (Continued)

OPTION	RECOMMENDED SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
Advanced Configuration Options	Press ENTER for menu.	
Reset SCSI Bus at IC Initialization	Enabled	
Extended BIOS Translation for DOS Drives >1 Gbyte	Enabled	
Host Adapter BIOS (Configuration Utility Reserves BIOS Space)	Enabled ¹	
Support Removable Disks Under BIOS as Fixed Disks ^{1,2}	Boot Only ¹	
Display <Ctrl-A> Messages During BIOS Initialization	Enabled ¹	
BIOS Support for Bootable CD-ROM	Disabled ¹	
BIOS Support for Int13 Extensions	Enabled ¹	

¹ No effect if BIOS is disabled.

² Do not remove media from a removable media drive if it is under BIOS control.

³ Set to Disable if NetWare 3.12 or 4.11 Network Operating System is installed.

Exiting SCSISelect

To exit SCSISelect, press ESC until a message prompts you to exit (if you changed any settings, you are prompted to save the changes before you exit).

Optional RAID Controller

Factory Installed Controllers

The RAID options available for your system are the dual channel Mylex AcceleRAID™ 150 (SecuRAID 110) and Mylex AcceleRAID™ 250 (SecuRAID 210) Controller boards, which gives your system the added security of fault tolerance.

If you order a system with a RAID controller, the system is pre-configured at the factory. Refer to the “RAID Configurations” table below to determine how the RAID controller was configured at the factory. If you want to reconfigure disk arrays and logical drives, you must run the AcceleRAID™ 150 or AcceleRAID™ 250 BIOS Configuration Utility; if you want to change the RAID level, you must run the Mylex Disk Array Controller Utilities (DACCF) software. Refer to the AcceleRAID™ 150 or AcceleRAID™ 250 documentation included with your system for information on running the AcceleRAID™ 150 or AcceleRAID™ 250 BIOS Configuration Utility and the DACCF utility.

RAID Configurations

Number of Hard Drives	RAID Level Configured	Hard Drives in Array	Description
1	JBOD	1	JBOD (RAID 0) JBOD is an acronym for Just a Bunch Of Disks. Each drive can operate independently as with a common host bus adapter; or multiple drives may be spanned and seen as a single very large drive. No redundancy is provided.
2	1	2	Mirroring (RAID 1) Drives are paired and mirrored. All data is 100% duplicated on an equivalent drive (fully redundant).
3	5	3	Striping with Parity (RAID 5) Data is striped across several physical drives. Parity protection is used for data redundancy.
4	5	3 plus 1 hot spare drive	Striping with Parity (RAID 5) Data is striped across three physical drives. Parity protection is used for data redundancy. This drive is used as the "Hot Spare."
5 or more	—	—	The first four disks are as stated above. The remaining disks are not part of the array, but are ready to be configured.

Add-on Controller

If you are adding a RAID controller to an existing system, the AcceleRAID™ 150 or AcceleRAID™ 250 BIOS Configuration Utility allows you to configure disk arrays and logical drives in your system. Since the utility resides in the AcceleRAID™ 150 or AcceleRAID™ 250 BIOS on the RAID controller, its operation is independent of the operating system in your server. Refer to Chapter 4 in this User's Guide for information on installing an add-in option board. Refer to Chapter 4 of the AcceleRAID™ 150 or AcceleRAID™ 250 Installation Guide for information on running the AcceleRAID™ 150 or AcceleRAID™ 250 BIOS Configuration Utility.

DACCF Configuration Utility

The DACCF utility is included with the RAID controller. The AcceleRAID™ 150 and the AcceleRAID™ 250 support various versions of RAID technology (referred to as RAID levels). To use any RAID level, you must configure the RAID controller using the DACCF Configuration Utility prior to installing your Network Operating System. For an explanation of this utility, refer to the *Disk Array Controller Configuration Utilities Manual* that was shipped with the controller. Chapter 2 (*Preparing the Array*) covers array hardware preparation, configuration, and initialization. After completing the steps in Chapter 2, you can install your Network Operating System.

Configuring System Board Jumpers

Before You Begin

Only a qualified technical person should perform the procedures in this section.

 **Note:** Electrostatic discharge (ESD) can damage the system board. Modify the system board only at an ESD workstation. Otherwise, wear an antistatic wrist strap attached to chassis ground.

The system board jumpers enable you to set specific operating parameters for your system. A jumper is a small plastic-encased conductor (shorting plug) that slips over two jumper pins.

Figure 3-1 shows the location of the system board jumpers. Table 3-10 lists the system board jumpers and their factory default settings.

Figure 3-1. System Board Jumpers

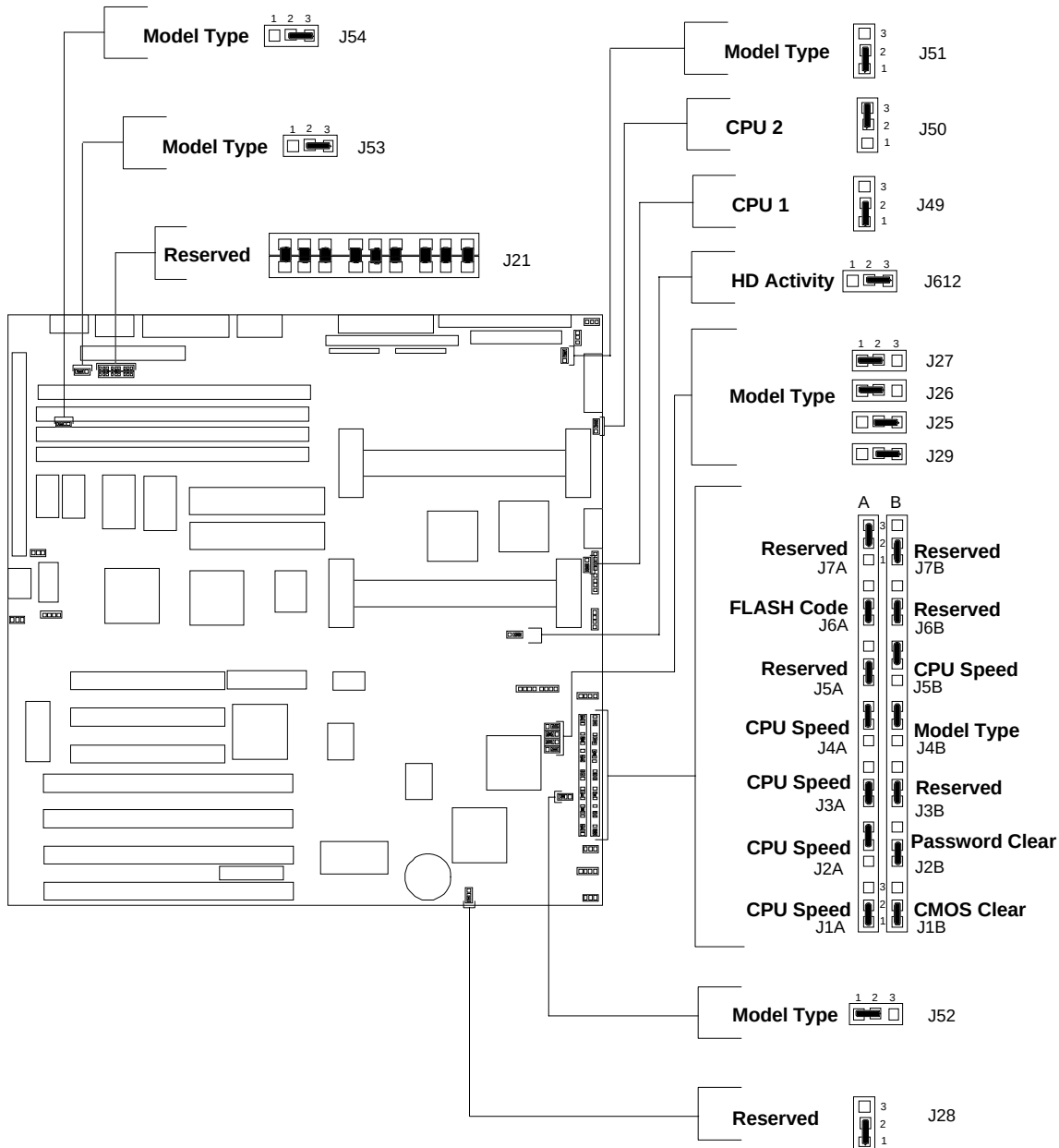


Table 3-10. System Board Jumper Configurations

Jumper	Description	Option	Setting	Factory Default	Your Setting
Reserved J7A		Required on factory default.	2-3	2-3	2-3
FLASH Code J6A	FLASH reprogramming power protection	BIOS not write protected; FLASH update BIOS write protected; no FLASH update	1-2 2-3	1-2	
Reserved J5A		Required on factory default.	1-2	1-2	1-2
CPU Speed J4A	Used with jumpers at J1A, J2A, J3A, J5B and J5B to set CPU speed	Refer to Table 3-11 to set CPU speed. Bus:CP Freq = 1:4 or 2:9 = pins 1-2; Bus:CP Freq = 1:2, 1:3, 2:5 or 2:7 = pins 2-3	Dependent on speed of installed CPU.		
CPU Speed J3A	Used with jumpers at J1A, J2A, J4A, J5B and J5B to set CPU speed	Refer to Table 3-11 to set CPU speed. Bus:CP Freq = 1:3 or 2:7 = pins 1-2; Bus:CP Freq = 1:2, 1:4, 2:5 or 2:9 = pins 2-3	Dependent on speed of installed CPU.		
CPU Speed J2A	Used with jumpers at J1A, J3A, J4A, J5B and J5B to set CPU speed	Refer to Table 3-11 to set CPU speed. Bus:CP Freq = 1:2, 1:3, 1:4, 2:5, 2:7 or 2:9 = pins 2-3	Dependent on speed of installed CPU.		
CPU Speed J1A	Used with jumpers at J2A, J3A, J4A, J5B and J5B to set CPU speed	Refer to Table 3-11 to set CPU speed. Bus:CP Freq = 2:5 2:7, or 2:9 = pins 1-2; Bus:CP Freq = 1:2, 1:3 or 1:4 = pins 2-3	Dependent on speed of installed CPU.		
Reserved J7B		Required on factory default.	1-2	1-2	1-2
Reserved J6B		Required on factory default.	1-2	1-2	1-2
CPU Speed J5B	Used with jumpers at J1A, J2A, J3A and J4A to set CPU speed	Refer to Table 3-11 to set CPU speed. Bus Freq = 60 MHZ = pins 1-2; Bus Freq = 66 MHZ = pins 2-3	Dependent on speed of installed CPU.		
Model Type J4B	Used with jumpers at J25, J26, J27, J29, J51, J52, J53 and J54 to set server model type	Required on factory default.	2-3	2-3	2-3
Reserved J3B		Required on factory default.	1-2	1-2	1-2
Password Clear J2B	Password protection	Password protection enabled Password cleared; protection off	1-2 2-3	1-2	
CMOS Clear J1B	Real-time clock CMOS protection	RTC CMOS protection enabled RTC CMOS cleared to factory defaults	1-2 2-3	1-2	
Reserved J21	All nine jumpers must be in	Required on factory default.	IN	IN	IN

Jumper	Description	Option	Setting	Factory Default	Your Setting
Model Type J25	Used with jumpers at J4B, J26, J27, J29, J51, J52, J53 and J54 to set server model type	Required on factory default.	2-3	2-3	2-3
Model Type J26	Used with jumpers at J4B, J25, J27, J29, J51, J52, J53 and J54 to set server model type	Required on factory default.	1-2	1-2	1-2
Model Type J27	Used with jumpers at J4B, J25, J26, J29, J51, J52, J53 and J54 to set server model type	Required on factory default.	1-2	1-2	1-2
Reserved J28		Required on factory default.	1-2	1-2	1-2
Model Type J29	Used with jumpers at J4B, J25, J26, J27, J51, J52, J53 and J54 to set server model type	Required on factory default.	2-3	2-3	2-3
CPU 1 J49	CPU 1 installed	CPU installed CPU NOT installed	1-2 2-3	1-2	1-2
CPU 2 J50	CPU 2 installed	CPU installed CPU NOT installed	1-2 2-3	2-3	
Model Type J51	Used with jumpers at J4B, J25, J26, J27, J29, J52, J53 and J54 to set server model type	Required on factory default.	1-2	1-2	1-2
Model Type J52	Used with jumpers at J4B, J25, J26, J27, J29, J51, J53 and J54 to set server model type	Required on factory default.	1-2	1-2	1-2
Model Type J53	Used with jumpers at J4B, J25, J26, J27, J29, J51, J52 and J54 to set server model type	Required on factory default.	2-3	2-3	2-3
Model Type J54	Used with jumpers at J4B, J25, J26, J27, J29, J51, J52 and J53 to set server model type	Required on factory default.	2-3	2-3	2-3
HD Activity J612	Used to "OR" the two HD activity signals	"OR" the two HD activity signals Separate HD activity signals	1-2 2-3	2-3	

Table 3-11. CPU Speed Jumper Configurations

CPU SPEED	Jumper Settings				
	J1A	J2A	J3A	J4A	J5B
233/66 MHz	1-2	2-3	1-2	2-3	2-3
266/66 MHz	2-3	2-3	2-3	1-2	2-3
300/66 MHz	1-2	2-3	2-3	1-2	2-3
333/66 MHz	2-3	2-3	1-2	1-2	2-3

Moving System Board Jumpers



Caution

Before doing the procedures in this section, make sure that your system is powered off and unplug the AC power cord from the back of the chassis. Failure to disconnect power before moving the jumpers can result in personal injury and equipment damage



Note: Observe static precautions. Use an antistatic wrist strap.

To configure the system board options:

1. Power off the system and remove the covers as described in the *Upgrades and Options* chapter.
2. Check to ensure the system power cord is removed from the back of the system.
3. Locate the position of the jumpers on the system board you are changing. Refer to Figure 3-1.
4. To change a jumper setting, use a pair of needle-nose pliers or your fingers to remove the jumper from its current location. Position the jumper over the two pins for the desired setting and press it onto the pins. Be careful not to bend the pins. Refer to Table 3-10 for system board jumper settings.
5. Record changes to the system board jumpers in Table 3-10.
6. Install the system covers and power up the system using procedures in chapter 4 of this guide.
7. Run the RCU utility to verify your reconfiguration of the system board.

Updating the BIOS

To update the system BIOS:



Note: This procedure clears the event log contents. If you want to save the event log contents, run the Event Log Reader Utility.

1. Using the EXPRESSBUILDER CD-ROM, create the BIOS FLASH diskette.
2. Insert a bootable DOS diskette into Drive A and power up the system.

-
3. Insert the BIOS FLASH diskette into Drive A.
 4. Enter PHFLASH and press ENTER.
 5. After the system reboots, load the default values by pressing F2 to enter setup. At the Exit Menu, select *GET DEFAULT VALUES*.
 6. Clear the event log by selecting *CLEAR EVENT LOG* at the Server Menu. Press space bar to change NO to YES and press ESC. Select *SAVE CHANGES & EXIT* and press ENTER to continue. The system will reboot.

If the procedure fails, perform the following steps and then retry the Update BIOS procedure.

1. Turn off the system and remove the panels as described in the *Upgrades and Options* chapter.
2. Ensure the FLASH Code jumper J6A is set to pins 1-2 to enable updates to the BIOS (see Figure 3-1).
3. Replace the panel and power up the system with the BIOS FLASH diskette inserted in Drive A

Resetting the CMOS NVRAM

To reset the CMOS NVRAM:

1. Power off the system and remove the panels as described in the *Upgrades and Options* chapter.
2. Move the CMOS Clear jumper J1B to pins 2-3 (see Figure 3-1).
3. Turn the system on and wait for the POST to complete. This will automatically reprogram the CMOS NVRAM to the default settings.
4. Power off the system.
5. Move the CMOS Clear jumper to from pins 2-3 to pins 1-2.
6. Replace the panels and power on the system.
7. Run the Setup Utility to configure your system.

Clearing and Changing the Password

To clear and change the password:

1. Power off the system and remove the panels as described in Chapter 4, *Upgrading Your System*.
2. Move the Password Clear jumper J2B to pins 2-3 (see Figure 3-1).
3. Power on the system and wait for POST to complete. This automatically clears the old password.
4. Power off the system.
5. Move the Password Clear jumper back to pins 1- 2.

-
- 6.** Replace the panels and power on the system.
 - 7.** To specify a new password run the Setup Utility as described earlier in this chapter.

4

Upgrading Your System

- General Information
- Static Precautions
- Preparing Your System for Upgrade
- Equipment Log
- Opening the Front Door
- Removing a Side Panel
- Installing a Side Panel
- Modifying the System Board
- Option Boards
- Installing a RAID Controller Board
- Hard Disk Drives
- Removable Media Devices

General Information



CAUTION

Operating your system with the side panels removed can damage your system components. For proper cooling and airflow, always replace the side panels before powering on your system.



Note: Your system error log will be lost, if your system ac power source is off or disconnected.

Contact your sales representative or dealer for a list of approved optional peripheral devices.

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Preparing Your System for Upgrade

Depending on the upgrade, you will need one or more of the following tools:

- Phillips screwdriver (#1 bit and #2 bit)
- Flat-head screwdriver
- Small needle nose pliers
- Pen or pencil
- ESD workstation or antistatic wrist strap (recommended)

Equipment Log

Use the equipment log form located at the end of this manual to record the model and serial number of your system, all installed options, and any other pertinent information specific to your system. You will need this information when configuring your system.

Opening the Front Door

To open the front door see Figure 2-4 in Chapter 2.

Removing a Side Panel

To install options in your system, you must remove the side panel on the left side of the system (as viewed from the front). The side panel on the right side of the system (as viewed from the front) only has to be removed when adding removable media devices. The right side panel removes in the same manner as the left side panel.



CAUTION

For proper cooling and airflow, do not operate the system with the side panels removed. Always replace the panels before powering on the system.



WARNING

If you are removing the side panel after the system is set up, you must first power off the system and all external devices and then **Unplug** the system power cord

To remove a side panel:

1. Power off the system and ensure it is disconnected from the ac wall outlet.
2. The side panel is secured to the chassis with three thumbscrews. Loosen the thumbscrews securing the side panel.
3. Slide the side panel toward the rear of the chassis. This unlocks the locking fingers behind the side panel.
4. Pull the side panel out and away from the chassis.

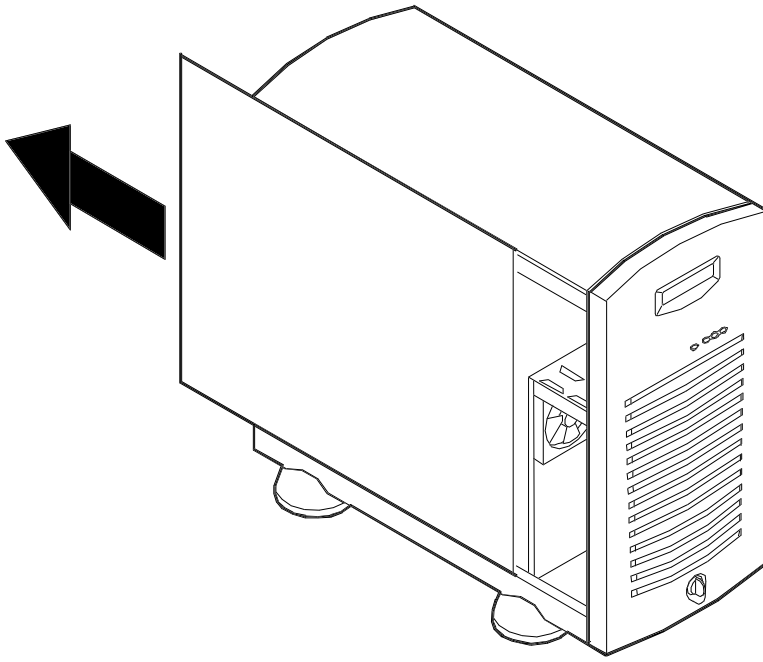


Figure 4-1 Removing a System Side Panel

Installing a Side Panel

1. Before replacing the side panel, make sure no tools or loose parts have been left inside the system chassis.
2. Make sure all option boards are firmly seated in their respective slots and that all interior cables are properly connected.
3. Insert the metal tabs on the top and bottom of the side panel into their slots on the chassis. Slide the side panel forward as far as it will go.
4. Secure the three side panels thumbscrews.

 **Note:** If your system is already set up, plug the system back in, reconnect the peripherals, and power on the peripherals and system.

Modifying the System Board

The following sections provide procedures for upgrading and configuring the system board in your system. Topics covered include:

- Replacing the Non-Volatile Memory
- Replacing the real-time clock battery
- Installing or removing a processor
- Installing or removing DIMMs.



CAUTION

Electrostatic discharge (ESD) can damage add-in boards and other components; place them on an antistatic surface. Modify the system board only at an ESD workstation. Otherwise, wear an antistatic wrist strap attached to chassis ground.

Replacing the Non-Volatile Memory

You may need to replace the non-volatile memory because of its internal integral lithium battery life span. Contact your sales representative or dealer for a list of approved devices. Its located on your system board as shown in Figure 4-3. Notice the dot on the chip. This dot will assist you in correctly positioning the chip on the system board.



CAUTION

Danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by manufacturer. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists. Do not expose the component to excessive heat or fire. Keep all batteries away from children

 **Note:** Observe static precautions. Use an antistatic wrist strap.

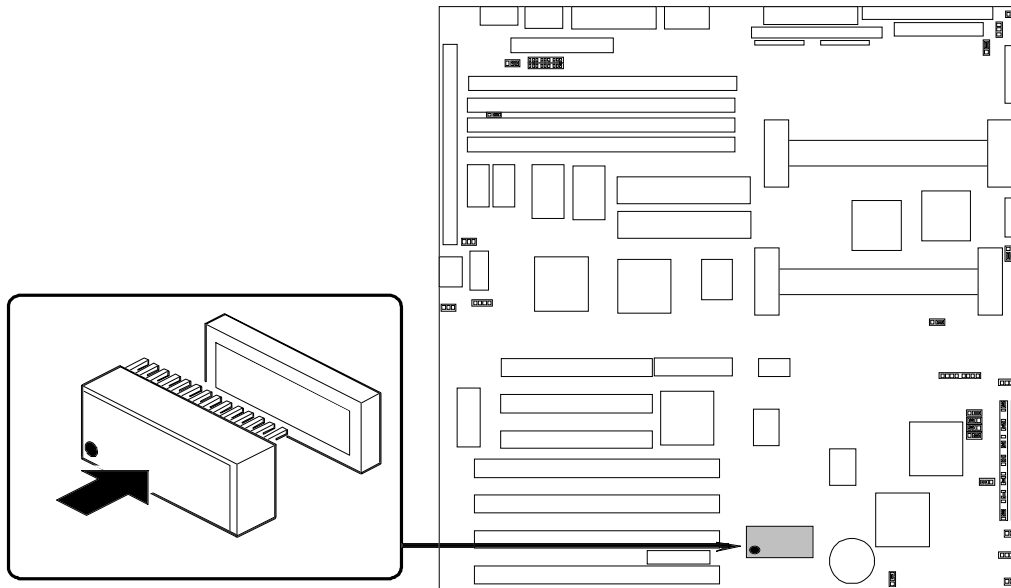


Figure 4-2 Non-Volatile Memory Location

1. Power off the system and remove the left side panel as described on page 4-3.
2. Using a IC removal tool or a small pointed tool, gently pry up each end of the non-volatile memory and pull it straight up out of its socket (Figure 4-2).
3. Orient the new chip over its socket so the dot is properly oriented. Carefully insert the chip into its socket connectors.
4. Press down on the chip until it is firmly seated in its socket.
5. Replace the side panel and turn on the system.
6. Run the BIOS SETUP and RCU to restore proper configuration settings.

Replacing the Real-time Clock Battery

You may need to replace the real-time clock battery because of its life span. The battery (Vendor Part #CR2450) is a commodity part available through many vendors. Its located on your system board as shown in the next figure. Notice the plus (+)sign on the battery. This sign will assist you in correctly positioning the battery on the system board.



CAUTION

Danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by manufacturer. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists. Do not expose the component to excessive heat or fire. Keep all batteries away from children



CAUTION

Observe static precautions. Use an antistatic wrist strap.

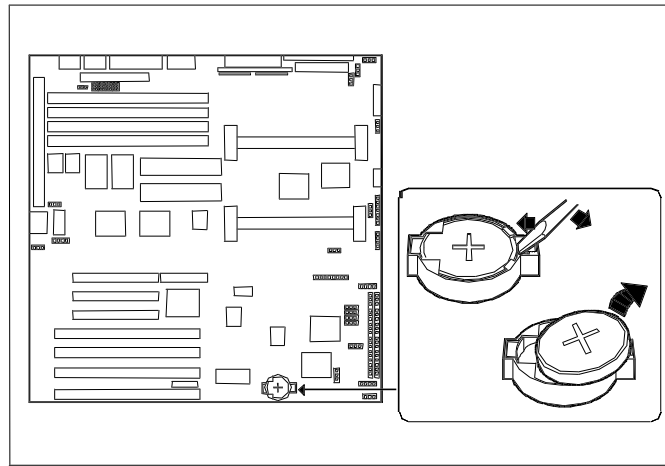


Figure 4-3 Replacing the Real-Time Clock Battery

1. Power off the system and remove the left side panel as described on page 4-3.
2. Using your finger nail or a small pointed tool, gently push down the top of the battery and pry up the battery out of its socket. Refer to Figure 4-3 for the socket location.
3. Orient the new battery over its socket so the plus (+) sign on the battery is facing up.
4. Carefully insert the bottom of the battery into the socket connectors and gently push the battery into the socket.
5. Press down on the battery until it is firmly seated in its socket.
6. Replace the side panel and turn on the system.
7. Run the RCU to restore configuration settings to the real-time clock.

Installing a Processor

The system board has two sockets for Pentium II Processors. Figure 4-4 illustrates the location for the optional Pentium processor in your system. When adding a second processor, use the same type and speed as the processor shipped with your system. Contact your sales representative.

 **Note:** Installing a second processor that is of a different type than the first processor, will result in system damage. Do not touch or bend the processor's exposed pins.

 **Note:** The voltage module for CPU 2 should not be installed in a mono processor system.

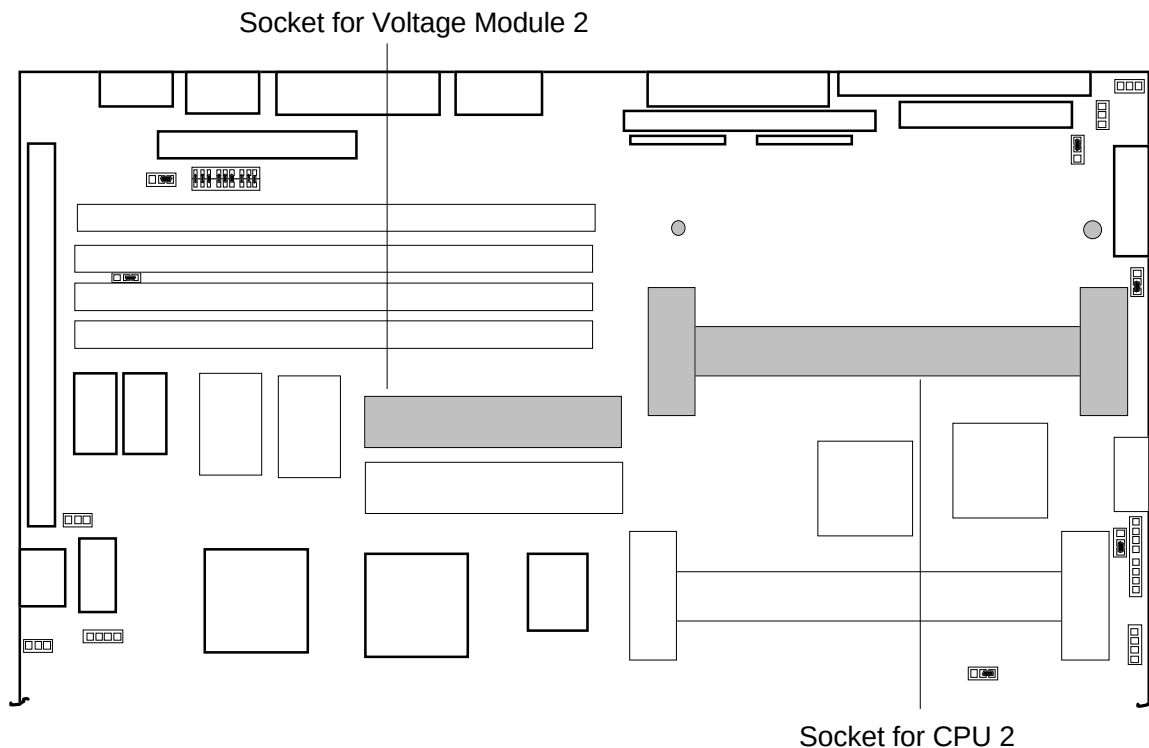


Figure 4-4. Optional Pentium II Processor

The processor upgrade kit contains a voltage module, processor module, and heat sink with two heat sink clips. The heat sink has a heat transfer pad on the bottom. To install the second Pentium II processor upgrade kit:

⚠ Warning

If the system has been running, any processor and heat sink already installed on the board will be hot. To avoid the possibility of a burn, let the components cool for 10 minutes before continuing with the procedures described here

1. Power off the system and remove the side panel as described on page 4-3.

 **Note:** Observe static precautions. Use an antistatic wrist strap.

2. Remove the terminator card from the CPU 2 socket.
3. Position the heat sink on the processor module and insert the heat sink clips that secure the heat sink to the processor.
4. The processor module is keyed so it can only be inserted one way. Position the processor over the CPU 2 socket on the board and press down evenly on the processor until the latches on both sides lock in place correctly.

 **Note:** Be sure the Pentium II module side latches are pushed all the way out. Otherwise, the module will not be locked into the socket.

5. Locate the voltage module. The connector for the module (Figure 4-4) is keyed so it can only be inserted one way. Position the module over the socket on the board and press down evenly on the module until it seats correctly.
6. Move the CPU 2 jumper J50 from pins 2-3 to pins 1-2 (Figure 3-1).
7. Replace the side panel and turn on the system.

Removing a Processor

Refer to Figure 4-6 while performing the following procedures. To remove an Pentium II processor:

1. Power off the system and remove the side panel as described on page 4-3.

 **Note:** Observe static precautions. Use an antistatic wrist strap.

2. Remove the processor module from the CPU 2 socket by pressing the release latches on either side of the module and pulling the module out of the mounting bracket.
3. Remove the heat sink support pins from the heat sink support base and remove the heat sink base.
4. Install a terminator card into the CPU 2 socket.
5. Remove the CPU 2 voltage module.
6. Move the CPU 2 jumper J50 from pins 1-2 to pins 2-3 (Figure 3-1).
7. Replace the side panel and turn on the system.

DIMMs

The system board contains four DIMM sockets labeled J17 through J20 (Figure 4-5). Each socket can hold a single 72-bit DIMM module with 32MB, 64MB, or 128MB of memory. When all four sockets are populated, the system board supports a maximum of 512MB of memory with 128MB DIMMs. A DIMM should be installed in the bottom (J20) socket. When you install additional DIMMs, you must start with the first empty socket above DIMMs already installed. When you remove DIMMs, you must start with the first DIMM socket closest to the top edge of the system board.

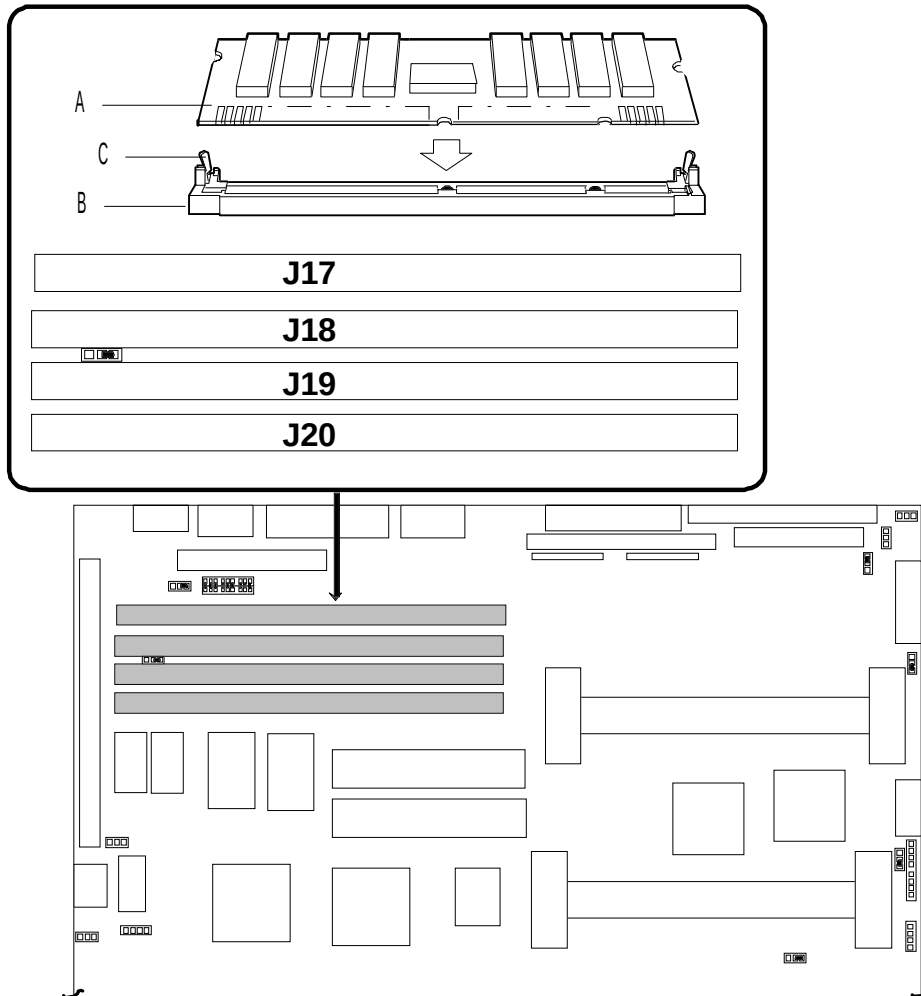


Figure 4-5 Inserting Memory DIMMs

Installing DIMMs

When properly installed, the DIMM module is oriented at an angle of 90 degrees relative to the system board.

1. Power off the system and remove the side panel as described on page 4-3.

 **Note:** Observe static precautions. Use an antistatic wrist strap. Hold DIMMs only by their edges.

2. Holding the DIMM module only by the edges, remove it from its antistatic package.
3. DIMMs are keyed so they can only be inserted one way. Position the DIMM over the socket on the board (Figure 4-5, A and B). The notches in the bottom edge of the DIMM mates with the raised bumps in the DIMM socket.
4. Press down evenly on the DIMM until it seats correctly. The white levers on the sockets are not "tools" to aid in the insertion, only to keep the DIMM's in place and to aid in extraction. The levers should click in place once the DIMM is fully inserted.
5. Repeat the above steps to install any remaining DIMMs.
6. Replace the side panel and turn on the system.

Removing DIMMs

 **Note:** Use extreme care when removing a DIMM. Hold DIMMs only by their edges. Place them on an antistatic surface; do not slide them across any surface. Applying too much pressure can break the retaining clips or damage the socket slot. Apply only enough pressure on the retaining clips to release the DIMM.

1. Power off the system and remove the side panel as described on page 4-3.
2. Remove the DIMM modules one at a time starting from the highest numbered sockets.
3. To remove each DIMM, gently spread the retaining clips (Figure 4-5, C) just enough so that you can pull the top edge of the DIMM (B) away from the clips.
4. Carefully lift the DIMM away from the socket and store it in an antistatic package.
5. Repeat the above steps to remove the remaining DIMMs.

Replace the side panel and turn on the system.

Option Boards

This section describes how to install and remove ISA and PCI option boards. The system board has three dedicated ISA bus expansion slots, two dedicated PCI bus expansion slots, and one shared PCI/ISA bus expansion slot (see Figure 4-6). You can install one ISA board or one PCI board in the shared slot, not both.

The high-performance PCI local bus allows the adoption of newer networking technology, such as ATM and 100 MB/second Ethernet NICs, with a minimum of effort and without concern for I/O bottlenecks. The PCI local bus offers up to 133 MB/second bandwidth.

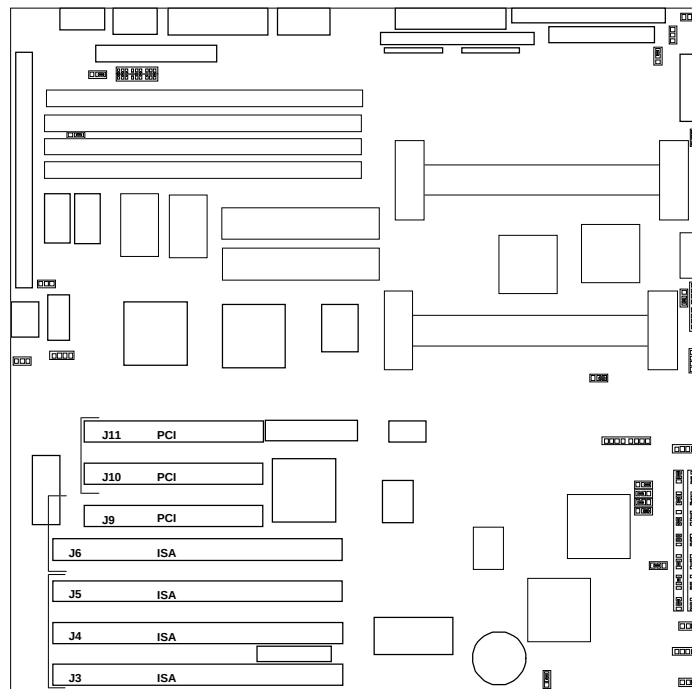


Figure 4-6 PCI and ISA Slot Locations

Installation Considerations

Newer adapters, designed for Plug-and-Play systems, are automatically configured by the system without any user intervention. Older ISA adapters must be manually configured as detailed below. Once the manual configuration is complete, the Plug-and-Play adapters are configured around the manually configured adapters without causing any resource conflicts.

ISA adapters can be Plug-and-Play. ISA adapters that are not Plug-and-Play must be manually configured following the instructions supplied with the board. The configuration is defined to the system by creating the ISA configuration file when running the RCU.

Consider the following points when installing option boards:

- ISA bus priority is slot J3 - J6, slot J3 having the highest priority. ISA slot J3 is the bottom option board slot on the system board. See Figure 4-6 for ISA slot numbers.
- PCI bus priority is slot J11 - J9, slot J11 having the highest priority. PCI slot J11 is the top PCI option board slot on the system board. See Figure 4-6 for PCI slot numbers.
- On system power-up and reboot, BIOS initiates a scan sequence looking for Plug-and-Play option boards installed since the last power up or reboot. The Plug-and-Play scan sequence is as follows:

First - BIOS scans for any Plug-and-Play ISA option board installed in slots J3 - J6, starting with slot J3.

Second - BIOS scans for any Plug-and-Play PCI option board installed in slots J11 - J9, starting with slot J11.

Always install option boards in the first available slot in the scan sequence. As an example, if there are ISA option boards installed in slots J3 and J4 of your system and slots J5 and J6 are vacant, install your Plug-and-Play option board into slot J5.

Controller/Adapter Hardware Configurations

Table 4-1 lists the option boards you may add to your system and provides information on slot location, memory and I/O addressing and assigned interrupt request number (IRQ).

Table 4-1. Option Board Hardware Configurations

OPTION BOARD	IRQ ³	MEMORY ADDRESS	I/O ADDRESS	OPTION SLOT
Intel 10/100	Set by BIOS	Set by BIOS	Set by BIOS	PCI Slot J10
Mylex 250	Set by BIOS	Set by BIOS	Set by BIOS	PCI Slot J11
Onboard 7880 SCSI	Set by BIOS	Set by BIOS	Set by BIOS	N/A ¹
Onboard 7860 SCSI	Set by BIOS	Set by BIOS	Set by BIOS	N/A ¹

1. For disk controllers plugged into slots and the onboard disk controllers, the sequence for BIOS scanning to determine the primary (Boot) disk controller is:

ISA slots J3 through J6
 PCI slot J11
 Onboard 7880 SCSI
 PCI slots J10
 Onboard 7860 SCSI
 PCI slot J9.

It is recommended that the BIOS be disabled on all SCSI controllers except for the controller with the boot disk drive attached (see *SCSI/Select Utilities* in the *Configuring Your System* chapter). This saves memory address resources and provides control over the boot device independent of board slot locations.

2. Additional IRQ's can be made available as follows:

Disabling Comm Port 1 = IRQ4 is available
 Disabling Comm Port 2 = IRQ3 is available
 Disabling Parallel Port = IRQ7 is available.

Installing an Option Board

1. Power off the system and remove the left side panel as described on page 4-3.
2. Remove and save the expansion slot retainer bar by pressing down on its top snap fastener and pulling the bar out.

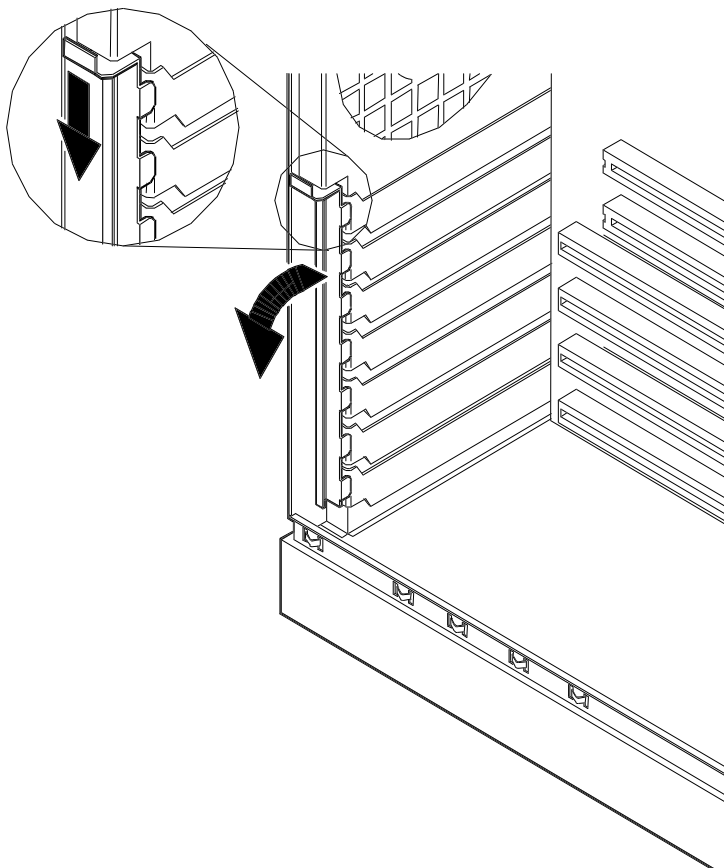


Figure 4-7 Removing the Expansion Slot Retainer Bar

3. Remove and save the expansion slot cover by sliding it straight back and out of the slot.

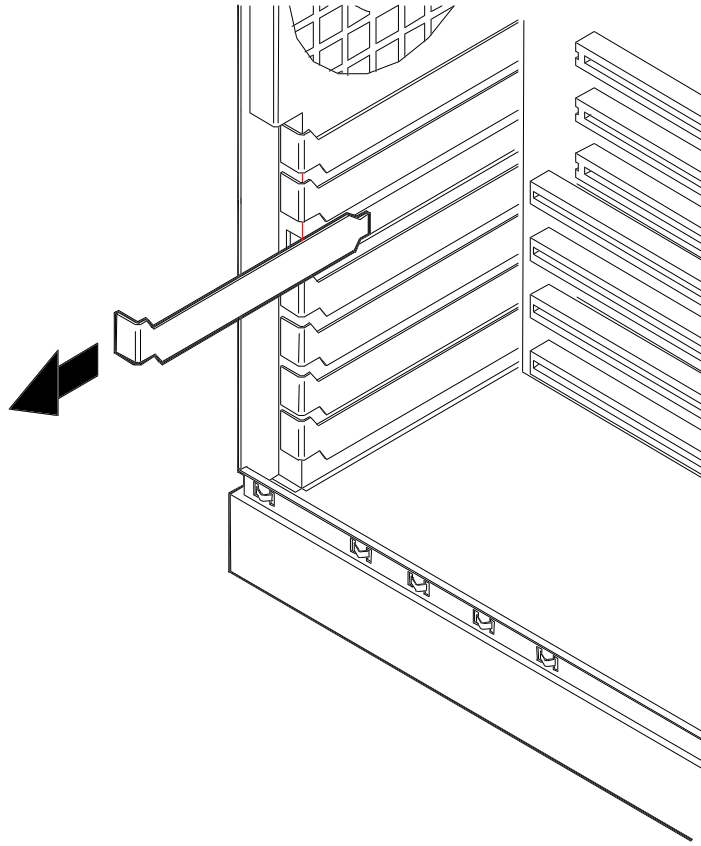


Figure 4-8 Removing the Expansion Slot Cover



CAUTION

Observe static precautions. Use an antistatic wrist strap.

4. Remove the option board from its protective wrapper, holding the board only by the edges. Do not touch the board components or the gold connectors.
5. Record the option board serial number in the equipment log.
6. Set any board jumpers or switches as described in the documentation that comes with the option board.
7. Refer to the documentation accompanying the option board for information on whether the board is a PCI or ISA board. Refer to “Option Board Hardware Configurations” table to determine the recommended option board slot assignment and configuration parameters.

 **Note:** If you are adding a non-Plug and Play Legacy ISA option board, run the RCU before installing the board.

-
- 8.** Holding the board by its top edge or upper corners, firmly press the board into an expansion slot on the system board. The tapered foot of the option board retaining bracket must fit into the mating slot in the expansion slot .

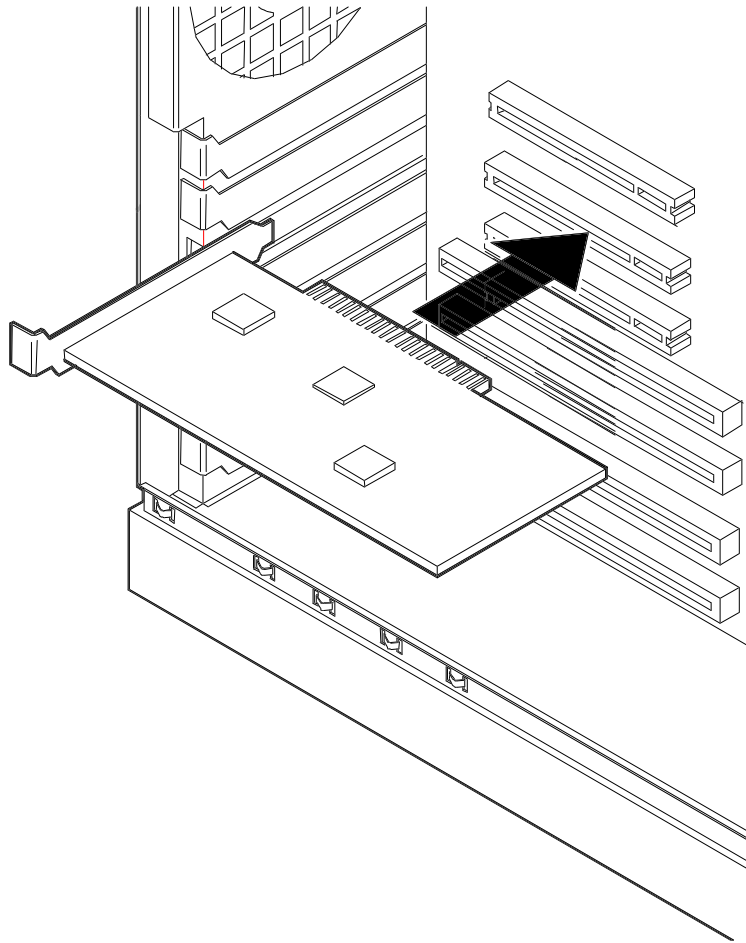


Figure 4-9 Installing an Option Board

- 9.** Align the rounded notch in the option board retaining bracket with the alignment tab in the expansion slot frame. The retaining bracket fits into the space that was occupied by the expansion slot cover.
- 10.** Be sure to push the bracket slot up against the expansion slot frame. If this is not done, the bracket may interfere with an adjacent bracket.
- 11.** Install the previously removed expansion slot retainer bar by pressing its top fastener into the top of the expansion slot frame. The bottom tapered tab of the expansion slot retainer bar fits into the mating slot on the bottom of the expansion slot frame.
- 12.** Connect any external cables (if they are needed) to the installed option board.
- 13.** Replace the left side panel, plug in the system power cord, and power on the system.

Removing an Option Board

 **Note:** Expansion slot covers must be installed on all vacant slots to maintain the electromagnetic emissions characteristics of the system and to assure proper cooling of the system components.

1. Power off the system and remove the left side panel as described on page 4-3.
2. Disconnect any cables attached to the option board you are removing.
3. Remove and save the expansion slot retainer bar by pressing down on its top fastener and pulling the bar out.
4. Hold the board at each end and carefully rock it back and forth until the edge connectors pull free. Make sure that you do not scrape the board against other components.
5. Remove the board from the expansion slot and place it in an antistatic wrapper. If you are replacing a board, go to "Installing an Option Board" on page 4-14; otherwise continue.
6. Install an expansion slot cover over the vacant slot.
7. Install the previously removed expansion slot retainer bar by pressing its top fastener into the lock plate at the top of the expansion slot frame. The bottom tapered tab of the expansion slot retainer bar fits into the mating slot on the bottom of the expansion slot frame.
8. Replace the left side panel, plug in the system power cords, and power on the system.
9. If you removed a non-Plug-and-Play ISA option board, run the RCU to configure the system.

Installing a RAID Controller Board

Use this procedure to install a Mylex RAID controller board.

1. Install the RAID controller board into PCI slot 2 of the system board. See "Installing an Option Board" on page 4-14.
2. Cable the RAID controller board as described below (see "System Cabling" in Appendix A).

Hard Disk Drives

Your system supports a variety of SCSI hard disk drives. The SCSI drives must use the industry standard 80-pin Single Connector Attachment (SCA) connector. Contact your sales representative or dealer for a list of approved devices. The internal hard disk drives are located in the SCSI Disk Drive Bays (A).

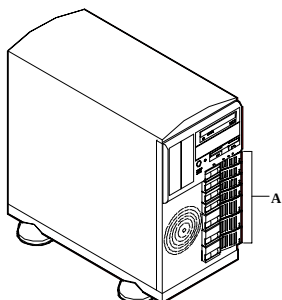


Figure 4-10 SCSI Disk Drive Bay Locations

If you are adding or removing a SCSI hard disk device, consider the following:



CAUTION

Do not hot swap a non-LVD-disk-drive into a LVD-disk-drive only system for it may cause data corruption. The only way a non-LVD-disk-drive can be used with an all LVD-disk-drive system is by first powering down the system, installing the non-LVD-disk-drive, and then powering the system back up.



Note: Installing a non-LVD-disk-drive into an all LVD-disk-drive system causes all the drives to operate in the non-LVD mode.

-
- The onboard SCSI controller support single-ended drives. If a RAID controller board is installed it supports Low Voltage Differential (LVD) disks. The hard disk SCSI address assignment is:

Bay	Device	SCSI ID Address
1	First 1.6 inch Hard Disk (Bottom)	0
2	Second 1.6 inch Hard Disk	1
3	Third 1.6 inch Hard Disk	2
4	Fourth 1.0 inch Hard Disk	3
5	Fifth 1.0 inch Hard Disk	4
6	Sixth 1.0 inch Hard Disk	5
7	Seventh 1.0 inch Hard Disk (Top)	6

Installing or Swapping a Hard Disk Drive in a Hot-swap Bay

This procedure describes installing a new drive or swapping out a faulty drive from one of the seven hot-swap SCSI disk drive bays. The 3 1/2-inch SCSI drives must use the industry standard 80-pin Single Connector Attachment (SCA) connector. Each drive must be installed in a drive carrier.

 **Note:** To order a disk with a carrier, contact your sales representative or dealer.

- If installing new drives, follow an installation scheme starting with the bottom drive. Fill the bays bottom to top.
- If an individual SCSI drive fault LED (yellow light) is on steadily, this indicates that the drive has been flagged as faulty by the RAID host controller. Follow the procedure described in this section to remove the faulty drive and swap in a good one.

 **Note:** ESD can damage disk drives, boards, and other parts. This system can withstand normal levels of environmental ESD while you are hot-swapping SCSI hard drives. However, we recommend that you do all procedures in this chapter only at an ESD workstation or provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground—any unpainted metal surface—on your system when handling parts.



CAUTION

Drive manufacturer's caution against moving a disk drive that is still spinning because of possible damage to the drive.

After you determine which drive has been flagged as faulty, the procedure is the same to swap a drive or to install one for the first time.

Installing or Swapping a Hard Disk Drive

1. Open the front door as shown in Figure 2-4.
2. If installing a hard disk drive in a disk carrier for the first time, perform the following procedures:
 - Pull the handle out of the disk carrier's front panel and remove the front panel from the SCSI hard disk drive bay.

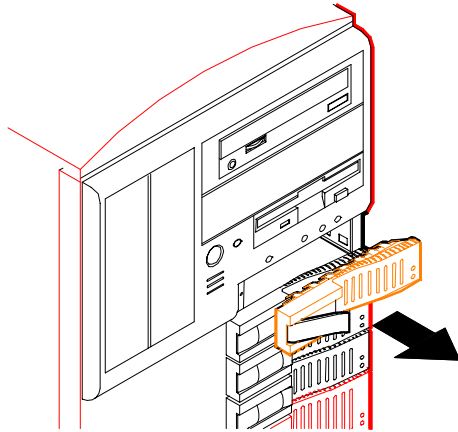


Figure 4-11 Removing the Disk Carrier's Front Panel

- Go to step 5.
3. If swapping a hard disk drive, remove its carrier from the SCSI hard disk drive bay and perform the following procedures:

 CAUTION

Depending on the drive fault, the drive may be still spinning when you remove it. Follow the next steps exactly when removing drives.

- Pull the disk carrier handle out.
 - Pull the faulty disk drive out of the bay far enough to disengage the drive connector from the backplane. Wait 30 seconds until the drive spins down.
 - Remove the carrier from the drive bay.
4. Remove the hard disk drive from the disk carrier.
 5. Remove the new drive from its protective wrapper, and place on an antistatic surface.

 CAUTION

Observe static precautions. Use an antistatic wrist strap.

6. Record the drive model and serial numbers in the equipment log.
7. Install the drive on the drive carrier.

-
- Place the drive on the carrier, with its connector facing the back of the carrier.
 - Turn the drive and carrier over and secure the drive in the carrier with the four screws supplied with the disk drive.

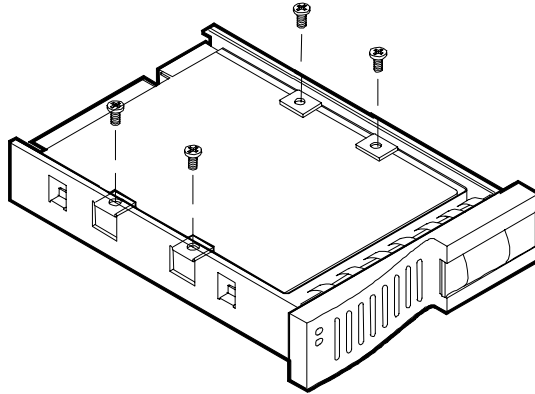


Figure 4-12 Securing the Drive in the Carrier

8. Install the drive carrier with drive into the bay as follows:
 - Close the drive carrier handle.
 - Align the drive carrier with the bay guide rails.
 - Slide the drive carrier into the bay until it docks with the SCSI backplane connector.

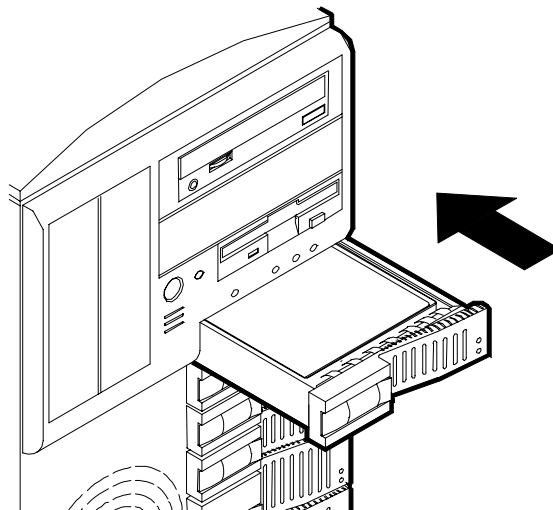


Figure 4-13 Installing a Disk Carrier into the Bay

-
9. Close the front door on the system. If necessary, configure the system as described in Chapter 3 "Configuring Your System".

Removable Media Devices

A variety of IDE and SCSI removable media devices can be installed in peripheral bays A, B, C, D, and E. A SCSI CD-ROM is always mounted in bay A. A 3.5-inch diskette drive is always mounted in bay C. Other devices should be installed in the first available bay from the top (bay B). Contact your sales representative or dealer for a list of approved devices.

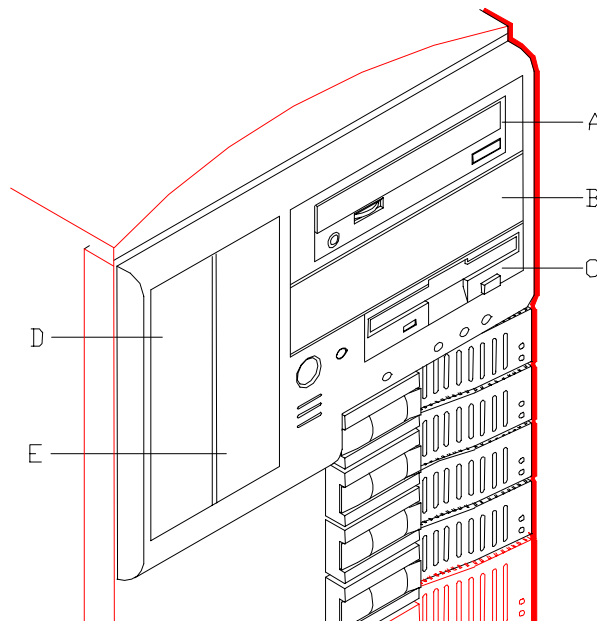


Figure 4-14

If you are adding or removing an IDE removable media device, consider the following:

- The system board supports a primary IDE channel connector which supports two devices. Your system includes the primary channel IDE interface cable.
- A first (master) device and a second (slave) device are supported on the IDE connector. Jumpers on the device determine the device configuration, master versus slave. Cable Sense (CS) device configuration is not supported.
- If only one device is on an IDE channel connector it must be set as the master device.

If you are adding or removing a SCSI removable media device, consider the following:

- The optional SCSI tape drive address assignment is 4.

-
- The SCSI termination resistors must be installed in the last SCSI drive of the daisy chain cabling. If the SCSI tape drive is your only SCSI device on the SCSI controller B, termination must be enabled in the tape drive.

Installing a 5.25-Inch Media Device



CAUTION

CD-ROM devices contain a laser system and are classified as CLASS 1 LASER PRODUCTS. To use these devices, thoroughly read the documentation provided by the CD-ROM manufacturer, and keep the documentation for future reference. In case of any trouble with a CD-ROM, please contact your nearest service representative. To prevent direct exposure to the laser beam, do not try to open the enclosure. Use of controls or adjustments or performance of procedures other than those specified in the CD-ROM manufacturer's documentation may result in hazardous radiation exposure

1. Power off the system, unplug the system power cords, and remove the appropriate side panel depending upon the bay you are installing the media device in. (See page 4-3 for directions.)
 2. Open the front door as shown in Figure 2-4.
-



CAUTION

Observe static precautions. Use an antistatic wrist strap.

3. Carefully remove the front system bezel by releasing its two plastic snap tabs on the back of the bezel and pulling it out (see figure below).

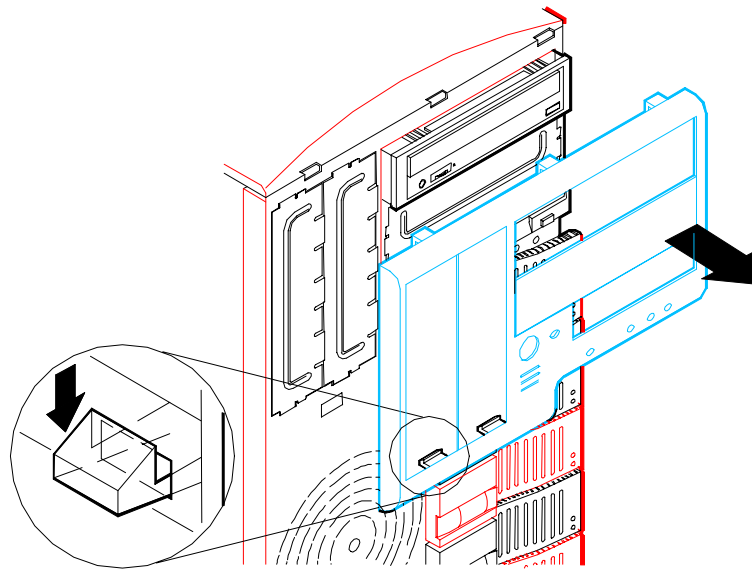


Figure 4-15 Removing the Front System Bezel

4. Remove the EMI metal shield covering the bay where you are installing a media device as shown below. The metal shield is removed by pulling on the tabs at the top and bottom of the metal shield.

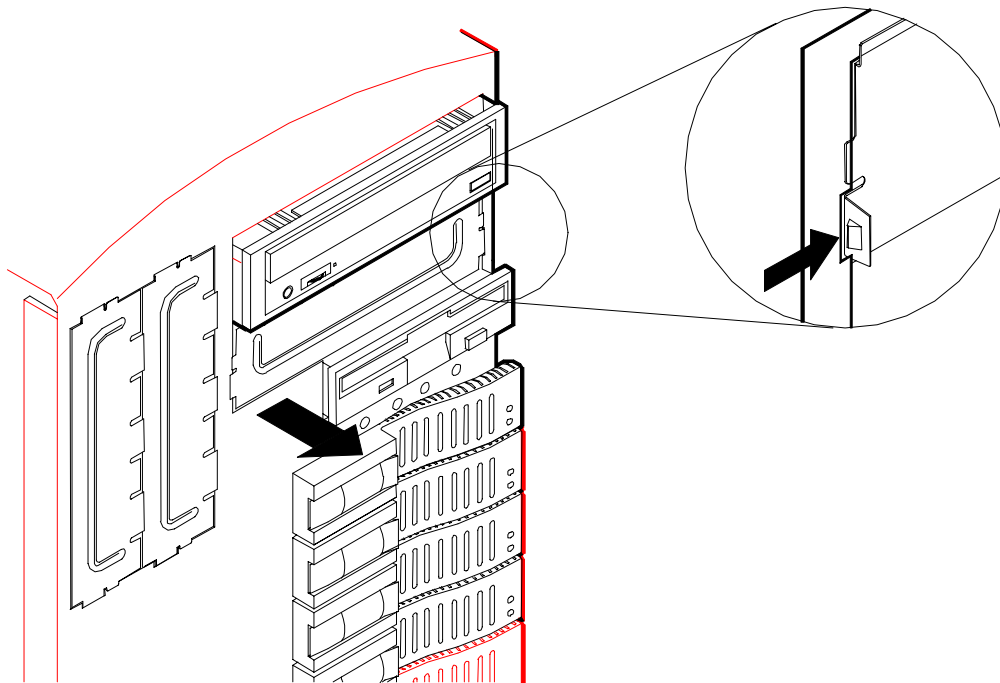


Figure 4-16 Removing an EMI Metal Shield

-
5. Remove the filler panel from the system bezel corresponding to the bay where you are installing a media device as shown below. The filler panel is released by pressing the plastic snap tabs located on the back of the system bezel. Save the panel for reinstallation.

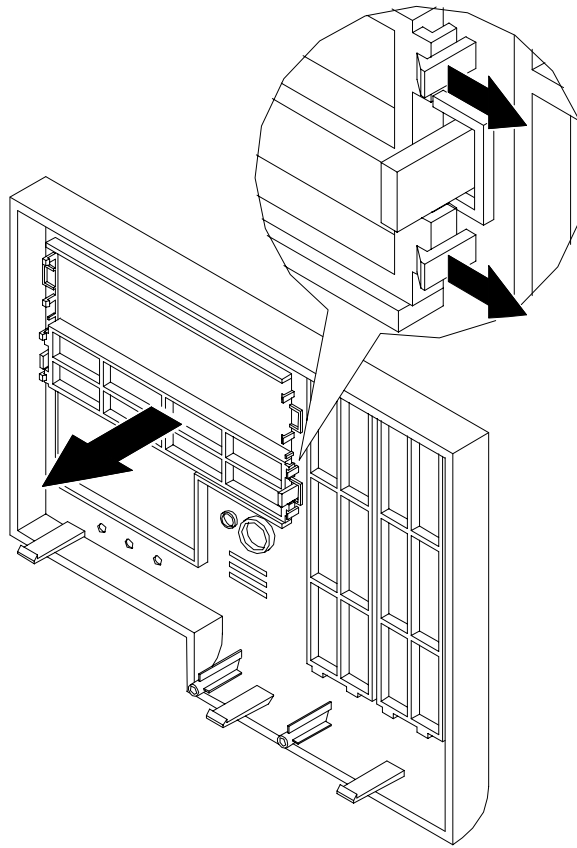


Figure 4-17 Removing a Filler Panel

6. Remove the device from its protective wrapper and place it on an antistatic surface. Record the drive model and serial number in the equipment log.
7. Set any drive jumpers or switches before you install the drive. See the documentation that comes with the device for jumper or switch information.

 **Note:** If the drive comes with drive rails, do not use them. Remove any rails already attached.

8. Attach the device side rails supplied with the system as shown below.

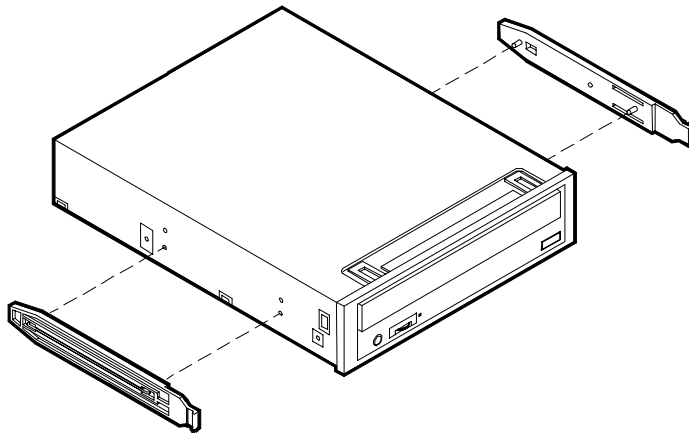


Figure 4-18 Attaching the Device Side Rails

9. Install the media device into the bay as follows:
- Move any cables in the bay out of the way.
 - Align the rails on the media device with the supports in the bay.
 - Slide the device into the bay until it locks in place.

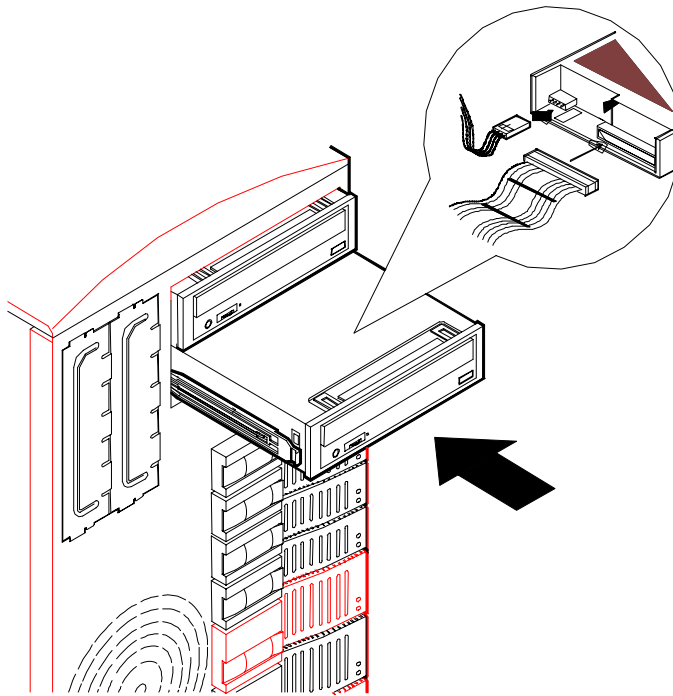


Figure 4-19 Installing a Removable Media Device

10. Connect the interface and power cables to the device as follows (see figure above):

- If you are installing a 5 1/4-inch tape drive or other IDE device, align and connect the drive signal cable and the system power cable to their connectors. The cable connector for the 5 1/4-inch device is keyed to fit only in the correct position. The red edge of the cable goes to pin 1 on the cable connector. Align the red edge of the connector with pin 1 (notched end) on the drive connector.
- If you are installing a SCSI device, connect the SCSI cable and system power cable. Be sure to align the SCSI cable connector (not keyed) with the device connector.

11. Carefully reinstall the front system bezel by inserting its top plastic tabs into the chassis top tab slots and then pushing its bottom portion straight in against the chassis (see figure below).

12. Close the front door, reinstall the side panel, and power on the system.

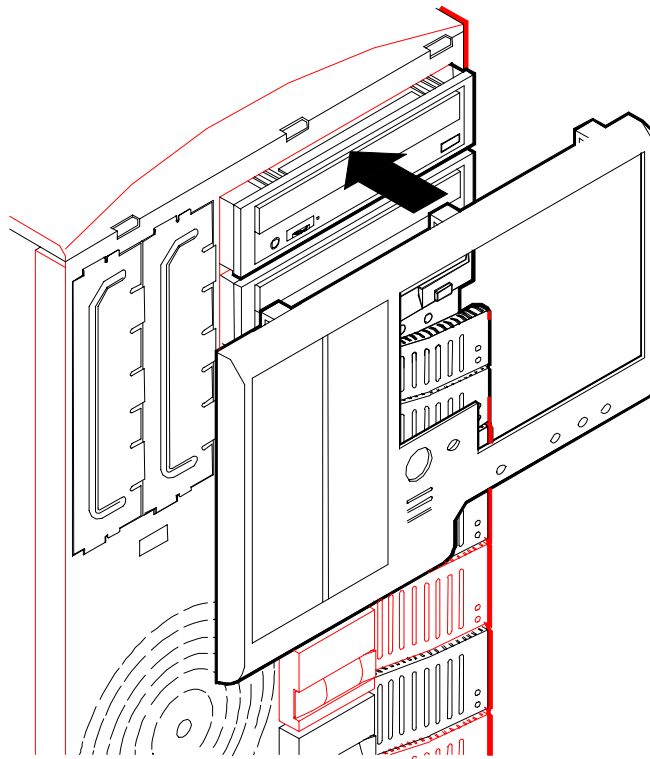


Figure 4-20 Installing the Front System Bezel

Removing a 5.25-Inch Device

1. Power off the system, unplug the system power cords, and remove the appropriate side panel depending upon the bay you are removing the media device from. (See page 4-3 for directions.)
2. Open the front door as shown in Figure 2-4.
3. Observe static precautions. Use an antistatic wrist strap.

CAUTION

Observe static precautions. Use an antistatic wrist strap.

4. Carefully remove the front system bezel by releasing its two plastic snap tabs on the back of the bezel and pulling it out (see figure below).

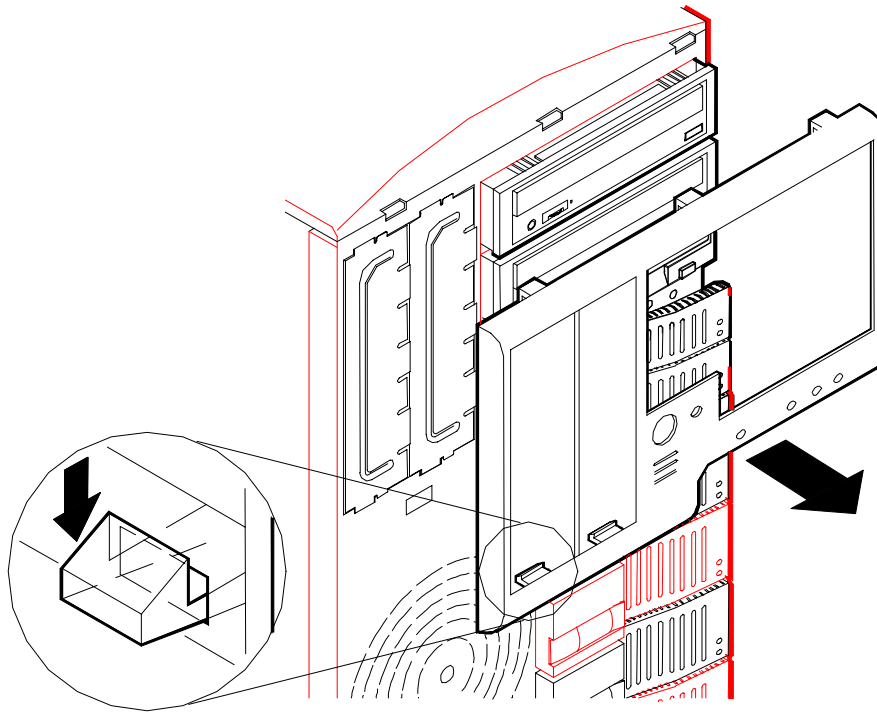


Figure 4-21 Removing the Front System Bezel

-
5. Disconnect the power cable (A) and ribbon data cable (B) from the device you are removing.

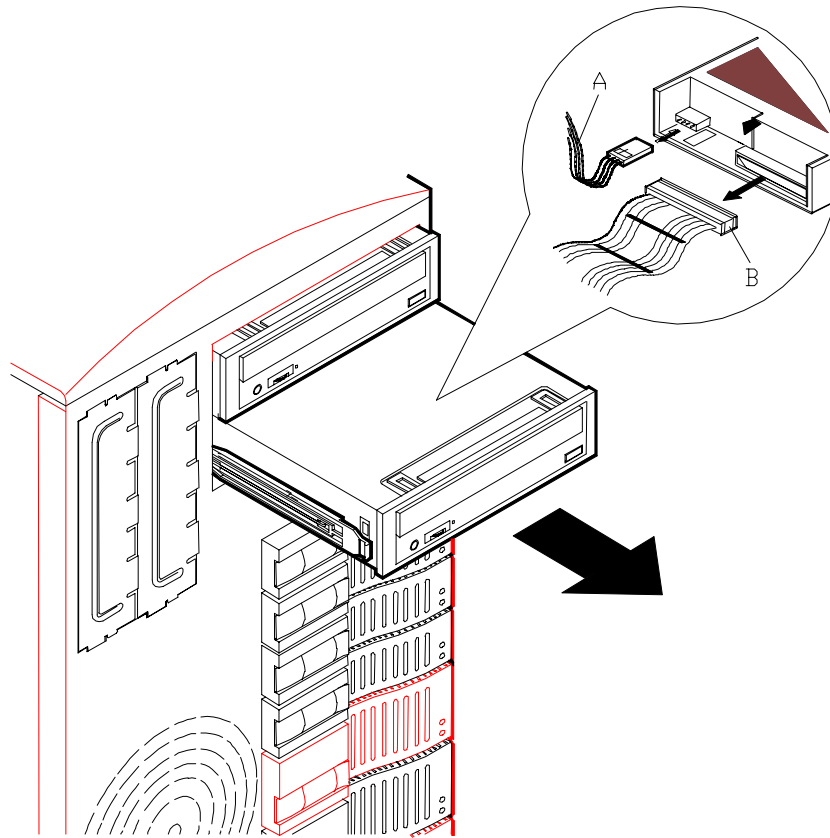


Figure 4-22 Removing a Removable Media Device

6. Remove the device from the peripheral bay by pushing in on its drive rail clips and pull the device completely out of the bay (see figure above).
7. Install an EMI metal shield over the bay area where you removed the peripheral device. The EMI shield is secured by just snapping it into place.
8. Install a filler panel in the open area of the system bezel corresponding to the bay where the media device was removed.
9. Replace the side panel and front panel, and power on the system.
10. Remove the drive serial number from the equipment log.

Problem Solving

- Problem Solving
- Static Precautions
- Troubleshooting Checklists
- Additional Troubleshooting Procedures
- Specific Problems and Corrective Actions
- Problems with the Network
- PNP Installation Tips
- BIOS User's Information

Problem Solving

This chapter helps you identify and solve problems that may occur during system installation or while using your system. The first section of this chapter tells you how to reset your system in the event of problems. The next few sections provide troubleshooting checklists and procedural steps that help you isolate specific system problems. The last section includes BIOS, system, and disk status user information.



CAUTION

Operating your system with the side panels removed can damage your system components. For proper cooling and airflow, always replace the side panels before powering on your system.

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Troubleshooting Checklists

The following subsections provide troubleshooting checklists for problems that occur at initial system startup, when you run new application software, and after the system hardware and software have been running correctly.

Initial System Startup

Incorrect installation or configuration usually causes problems that occur at initial system startup. Hardware failure is a less frequent cause. If you have problems during initial system startup, check the following:

- Are the system power cords properly connected to the system and plugged into a NEMA 5-15R outlet (100-120 Vac) or a NEMA 6-15R outlet (200-240 Vac)?
- Is AC power available at the wall outlet?
- Is the power on/off push-button switch on the front panel in the ON position (power on LED should be lit)?
- Are all cables correctly connected and secured?
- Are all the PCI/ISA option boards fully seated in their connector slots on the system board?
- Are all jumper settings on the system board correct? For jumper information, see Chapter 3, Configuring Your System.

-
- Are all jumpers and switch settings on option boards and peripheral devices correct? To check these settings, see the respective appendices. If applicable, ensure that there are no conflicts; for example, two option boards sharing the same interrupt.
 - Are the processors fully seated in their slots on the system board? Refer to the Chapter 4, Upgrading Your System, for installation instructions.
 - Are all DIMMs fully seated and installed correctly? Refer to Chapter 4, Upgrading Your System, for installation instructions.
 - Are all option boards and disk drives installed correctly? Refer to Chapter 4, Upgrading Your System.
 - Is the system hard disk drive properly formatted or defined?
 - Is the operating system properly loaded? Refer to the operating system documentation.
 - Are all drivers properly installed? For information about installing drivers, refer to your Network Operating System Configuration Guide.
 - Are the configuration settings in BIOS Setup and the Resource Configuration Utility (RCU) correct? For information about running these utilities, see Chapter 3, Configuring Your System.

If the above items are all correct, but the problem reoccurs, refer to “Additional Troubleshooting Procedures,” page 5-4.

Running New Application Software

Problems that occur when you run new application software are usually related to the software. Faulty equipment is much less likely, especially if other software runs correctly. If you have problems while running new application software, check the following:

- Does the system meet the minimum hardware requirements for the software? Refer to the software documentation.
- Is the software an authorized copy? Unauthorized copies often do not work. Obtain an authorized copy of the software.
- If you are running the software from a diskette, is it a good copy?
- If you are running the software from a hard disk drive, is the software correctly installed? Were all necessary procedures followed and files installed?
- If you are running the software from a CD-ROM disk is the disk scratched or dirty?
- Are the correct device drivers installed?

-
- Is the software correctly configured for the system?
 - Are you using the software correctly?
 - If other software runs correctly on the system, contact your vendor about the failing software.

If the problems persist with the software, contact the software vendor's customer service representative.

After System Has Been Running Correctly

Problems that occur after the system hardware and software have been running correctly often indicate equipment failure. However, many situations that are easy to correct can also cause such problems. If you have problems after the system has been running correctly, check the following:

- If you are running the software from a diskette or CD-ROM, try a new copy of the software.
- If you are running the software from a hard disk drive, try running it from a floppy. If the software runs correctly, there may be a problem with the copy on the hard disk. Reinstall the software on the hard disk drive and try running it again. Make sure all the necessary files are installed.
- If the problem recurs, you may need to reformat the hard disk drive. The hard disk drive, the drive controller, or the system board may be defective.
- If the problems are intermittent, there may be a loose cable, dirt in the keyboard (if keyboard input is incorrect), a marginal power supply, or other random component failures.
- If you suspect that a transient voltage spike, power outage, or brownout might have occurred, reload the software and try running it again. Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and the system not responding to user commands.

 **Note:** Voltage spikes can corrupt or destroy data files on the drive. If you are experiencing voltage spikes on the power line, install a surge suppresser between the power outlet and the system power cord.

If the problem recurs after you have checked and corrected all of the above items, refer to the next section, “Additional Troubleshooting Procedures”.

Additional Troubleshooting Procedures

This section provides a more detailed approach to diagnostic testing and identification of a problem and locating its source.

Use the following troubleshooting procedures to help you identify a problem. These general procedures lead you through the following:

-
- Preparing the system for diagnostic testing
 - Monitoring POST while it is running
 - Verifying proper operation of key system LEDs
 - Confirming loading of the operating system.

Preparing the System for Diagnostic Testing

To prepare the system for diagnostic testing, perform the following:

 **Note:** Before disconnecting any peripheral cables from the system, turn off the system and any external peripheral devices. Failure to do so can cause permanent damage to the system and/or the peripheral devices.

1. Turn off the system and all external peripheral devices. Disconnect all devices from the system except the keyboard and video monitor.
2. Make sure the system power cords are plugged into a properly grounded AC outlet.
3. Make sure your video display monitor and keyboard are correctly connected to the system. Turn on the video monitor. Set its brightness and contrast controls to at least two-thirds of their maximum ranges (refer to the documentation supplied with your video display monitor).
4. If the operating system normally loads from the hard disk drive, make sure there is no diskette in drive A. Otherwise, place a diskette containing the operating system files in drive A.
5. Turn on the system. If the power indicator LED does not light, refer to “Power LED Does Not Light” on page.5-7.

Monitoring POST

Each time you turn on the system, the power-on self-test (POST) runs automatically and checks the system board, CPU, memory, keyboard, and most installed peripheral devices.

During the memory test, POST displays the amount of memory that it is able to access and test. Depending on the amount of memory, it may take several minutes to complete the memory test. If you do not want to wait for it to complete, you can terminate it by pressing CTRL+ALT+S.

Press F2 key if you want to run SETUP.

If you do not press <F2>, the above message remains for a few seconds and the boot process continues.

If POST finds an error, it displays an error message and, in case there is a problem with the display, puts out a series of long and short beeps. Write down any beep code emitted. This information is useful to your service representative.

Refer to the *BIOS User's Information* section in this chapter for a list of items to check for each error code and for an explanation of the error beep codes.

Table 5-1 lists keys active during POST and provides a description of errors that may occur.

Table 5-1. POST Keys and Errors

ACTION/MESSAGE	DESCRIPTION
To Abort Memory Test	Press ctrl+alt+s during the memory test.
If POST Beeps Before Video Appears	Initialization failed before video initialized. Most beep code errors are fatal; initialization cannot continue. Refer to the section <i>BIOS User's Information</i> in this chapter.
If Monitor Displays Error	Note error; press F1 to continue boot or F2 to enter Setup. Refer to the section <i>BIOS User's Information</i> in this chapter.
To Enter Setup	Setup changes specific options, then writes to CMOS, NVRAM. Press F2 during initialization to run Setup. If you do not press F2, the boot process continues.
Enter BOOT Diskette	If prompted, insert the boot diskette.

The BIOS indicates errors by writing an error code to the PS/2-standard logging area in the Extended BIOS Data Area, and by displaying a message on the screen, which is sometimes preceded by the POST Error Code. The error code will also be logged to the Event Logging area.

Report any error code to your service representative.

Verifying Proper Operation of Key System Indicators

As POST determines the system configuration, it tests for the presence of each mass storage device installed in the system. As each device is checked, its activity indicator should turn on briefly. Check for the following:

- Does the diskette drive activity indicator turn on briefly? If not, refer to “Diskette Drive Activity Indicator Does Not Light” on page 5-9.
- If a second diskette drive is installed, does its activity indicator turn on briefly? If not, refer to “Diskette Drive Activity Indicator Does Not Light” on page 5-9.
- If there is a hard disk drive or SCSI devices installed in the system, does the hard disk drive activity indicator turn on briefly? If not, refer to “Hard Disk Drive Activity Indicator Does Not Light” on page 5-9.

Confirming Loading of the Operating System

Once the system boots up, the operating system prompt appears on the screen. The prompt varies according to the operating system. If the operating system prompt does not appear, refer to “Problems with Application Software,” page 5-10.

Specific Problems and Corrective Actions

This section provides possible solutions for the following specific problems:

- Power LED does not light
- No beep or incorrect beep pattern
- No characters appear on screen
- Characters on the screen appear distorted or incorrect
- System cooling fan does not rotate
- Diskette drive activity LED does not light
- Hard disk drive activity LED does not light
- CD-ROM drive activity LED does not light
- Problems with application software
- The startup prompt “Press <F2> key if you want to run Setup” does not appear on the screen.
- The bootable CD-ROM is not detected.

Try the solutions in the order given. If you cannot correct the problem, contact your service representative for assistance.

Power LED Does Not Light

Check the following:

- Is the system operating normally? If so, the power LED is probably defective.
- Are there other problems with the system? If so, check the items listed under System Cooling Fans Do Not Rotate.

Incorrect or No Beep Code

Check the following:

- Is the speaker enabled?
- Is the speaker cable connected to the system board?

If the system operates normally, but there was no beep, the speaker may be defective, contact your service representative for assistance.

Record the beep code emitted by POST, and see “BIOS User’s Information, page 5-14.

No Characters Appear on Screen

Check the following:

- Is the keyboard working? Check to see if the **Num Lock** light is functioning.

-
- Is the video display monitor plugged in and turned on?
 - Are the brightness and contrast controls on the video monitor properly adjusted?
 - Are the video monitor switch settings correct?
 - Is the video monitor signal cable properly installed?
 - Is the onboard video controller enabled?

If you are using an option video controller board, perform the following:

1. Verify that the video controller board is fully seated in the system board connector.
2. Run the RCU to disable the onboard video controller.
3. Reboot the system for changes to take effect.

If there are still no characters on the screen after you reboot the system, contact your service representative or authorized dealer for assistance.

POST emits one long beep and two short beeps pattern to indicate a possible problem with the video display controller. If you do not receive a beep pattern and characters do not display, the video display or video controller may have failed. Contact your service representative or authorized dealer for assistance.

Characters are Distorted or Incorrect

Check the following:

- Are the brightness and contrast controls properly adjusted on the video display?
Refer to the documentation supplied with your video display.
- Are the video monitor's signal and power cables properly installed?
- If the problem persists, the video monitor may be faulty or it may be the incorrect type. Contact your service representative for assistance.

System Cooling Fans Do Not Rotate

 **Note:** The system has a cooling fan module (containing either two or three fans) behind the hard disk drives. In addition, there are two fans one directly in front of and one directly behind the system board, including a place reserved for an optional fan directly under the rear fan, and another cooling fan that is an integral part of each power supply. There are no serviceable components inside the power supply. If the power supply is opened, the manufacturer's warranty is voided.

Check the following:

- Is AC power available at the wall outlet?
- Are the system power cords properly connected to the power supplies and the AC wall outlets?

-
- Are the power connectors for the cooling fan module and fans connected to the system board?
 - Is the front panel power on indicator lit?

If the switches and connections are correct and the power outlet is functioning, the power supply has probably failed. Contact your service representative for assistance.

Diskette Drive Activity LED Does Not Light

Check the following:

- Are the diskette drive's power and signal cables properly installed?
- Is the diskette drive properly configured?
- Is the diskette drive activity light always on? If so, the signal cable may be plugged in incorrectly.

If you are using the onboard diskette controller, use Setup or the RCU to make sure that Onboard Floppy is set to Enabled. Conversely, to use an optional fixed/diskette controller, make sure that Onboard Floppy is set to **Disabled**.

If the problem persists, there may be a problem with the diskette drive, system board, or drive signal cable. Contact your service representative for assistance.

Hard Disk Drive Activity LED Does Not Light

If you have installed one or more hard disk drives in your system, check the following:

- Is the optional disk controller board fully seated in the system board connector?
- Is the disk drive seated properly?
- Are the jumpers on the system board set correctly?
- Is the hard disk controller properly configured in the RCU?
- Is the hard disk activity LED cable connector plugged into the optional controller board, if present?

If you received error messages, refer to the *Error Messages* section for information about error messages.

If you did not receive error messages, run the RCU to make sure that the hard disk drive is configured with the correct parameters. For information about running the RCU, refer to Chapter 3, *Configuring Your System*.

If the problem persists, there may be a problem with the hard disk drive, the optional controller board, system board, drive signal cable, or LED connector. Contact your service representative for assistance.

CD-ROM Drive Activity Light Does Not Light

Check the following:

-
- Is the power and signal cable to the CD-ROM drive properly installed?
 - Are all relevant switches and jumpers on the drive set correctly?
 - Is the drive properly configured?
 - Is the onboard IDE controller enabled?

Problems with Application Software

If you have problems with application software, perform the following:

- Verify that the software is properly configured for the system. Refer to the software installation and operation documentation for instructions on setting up and using the software.
- Verify a different copy of the software to see if the problem is with the copy that you are using.
- Make sure all cables are installed correctly.
- Verify that the system board jumpers are set correctly. Refer to the “Configuring Your System” chapter for jumper settings.
- If other software runs correctly on the system, contact your vendor about the failing software.

If the problem persists, contact the software vendor's customer service representative for assistance.

Press F2 Key to Enter Setup: Prompt Does Not Display

If the prompt “Press **F2** key to run Setup” does not appear at system startup, then the prompt option has been disabled in the RCU. To enable the prompt:

- Reboot the system using your RCU diskette 1, and go into the RCU to enable the prompt.

Enable F2 Prompt by Using RCU

1. Insert your RCU diskette in the diskette drive. This is the diskette that is created by copying the RCU software from EXPRESSBUILDER CD-ROM that comes with the system.
2. Reboot the system by pressing **Ctrl+Alt+Del** while at the DOS operating system prompt *or* by pressing the reset switch.
3. When the DOS Startup menu appears, select 1 or 2 to enter the RCU.
4. Select Step 3, “Change Configuration Settings.” If a password menu displays, enter a user or administrative password if either is enabled, or just press **ESC** to bypass this menu prompt.
5. Select the System Board.
6. Page down until you reach the Boot Subsystem Group. It is toward the end of the groups.
7. Find and select the option that says, “Display ‘F2 for Setup’ Message during POST.”
8. Press **Enter** to display the option menu.
9. Select **Enable** and press **Enter**.
10. If you are finished editing the settings for the system board, press **Esc**. This takes you back up to the main menu, Step 3.
11. Press **Esc** again to return to the main RCU menu.
12. Select Step 4, Save Configuration. Once you select this step, the changes are immediately saved into an INF file, a CMS file, and nonvolatile memory.
13. Press **Esc** to exit the RCU. You will be prompted to reboot the system or simply exit to the command line prompt. You’ll need to reboot the system to let your changes take effect, but **first** remove the RCU diskette drive. **Then** press **F10** to reboot.

You should now see the **F2** prompt displayed at bootup.

Enable F2 Prompt by Changing a Jumper and Using RCU

If you do not have an RCU diskette or CD available, you can clear CMOS memory to enable the **F2** prompt. This means you must change a jumper on the system board, run the RCU, save your changes, and change the jumper back to the default setting.



CAUTION

This procedure resets *all* to default settings: Clearing CMOS memory resets *all* RCU and Setup settings to their defaults, not just the CMOS CLR setting. Before proceeding, check that you have a backup paper copy of configuration. Referring to the worksheets could make your reconfiguration task easier.

-
1. Observe the safety and ESD precautions stated at the beginning of this chapter.
 2. Turn off all connected peripherals, turn off system power, and disconnect the AC power cord.
 3. Remove the side cover. Refer to the “Upgrades and Options” chapter for information on removing the side cover. You do not need to remove the system board from the chassis, and you probably do not need to remove any add-in boards.
 4. Locate the CMOS configuration jumper at the edge of the system board toward the front of the system. Refer to the “Configuring Your System” chapter for information on the location of the CMOS jumper.
 5. Move the CMOS CLR jumper from the CMOS Protect setting on pins 1 and 2 to the CMOS Clear setting on pins 2 and 3.
 6. Reinstall the side cover for your safety, and connect the power cord to the system.
 7. Power on the system. POST starts and halts displaying an “Invalid CMOS Settings” error.
 8. Turn off the system, and disconnect the power cords.
 9. Again remove the side cover.
 10. Move the CMOS CLR jumper from pins 2 and 3 back to pins 1 and 2 (the Protect CMOS memory position).
 11. Reinstall the side cover, and connect the power cords.
 12. Turn the system on. Run BIOS Setup (F2) to verify the correct settings. Refer to Chapter 3 for information on running BIOS Setup.

Bootable CD-ROM Is Not Detected

Check the following:

- Is the BIOS set to allow the CD-ROM to be the first bootable device? Check your BIOS Setup (F2) configuration.

Problems with the Network

The server hangs when the drivers are loaded:

- Change the PCI BIOS interrupt settings. Try the “PCI Installation Tips” below.

Diagnostics pass, but the connection fails:

- Make sure the network cable is securely attached.
- Make sure you specify the correct frame type in your NET.CFG file.

The Link LED doesn't light:

- Make sure you have loaded the network drivers.
- Check all cable connections.
- Try another port on the hub.
- Make sure you have the correct type of cable between the adapter and the hub. Some hubs require a crossover cable while others require a straight-through cable (for more information on crossover cabling, see your hub documentation).

The Activity LED doesn't light:

- Make sure you've loaded the correct network drivers.
- Network may be idle. Try accessing a server.

The controller stopped working when an add-in adapter was installed:

- Make sure the cable is connected to the port from the onboard network controller.
- Make sure your PCI BIOS is current. Try the “PCI Installation Tips” below.
- Make sure the other adapter supports shared interrupts. Also, make sure your operating system supports shared interrupts; OS/2 does not.
- Try reseating the add-in adapter.

The add-in adapter stopped working without apparent cause.

- Try reseating the adapter first; then try a different slot if necessary.
- The network driver files may be corrupt or deleted. Delete and then reinstall the drivers.
- Run the diagnostics.

PNP Installation Tips

Some common PCI tips are listed here.

- Reserve interrupts (IRQs) and/or memory addresses specifically for ISA adapters. This prevents PCI cards from trying to use the same settings ISA cards are using. Use the RCU to keep track of ISA adapter resources.
- Certain drivers may require interrupts that are not shared with other PCI drivers. The RCU can be used to adjust the interrupt numbers for PCI devices. For certain drivers, it may be necessary to alter settings so that interrupts are not shared.

BIOS User's Information

This section describes the various screen messages and beep codes of the system BIOS. The BIOS indicates errors by writing an error code to the PS/2-standard logging area in the Extended BIOS Data Area, and by displaying a message on the screen, which is sometimes preceded by the POST Error Code. The error code will also be logged to the Event Logging area.

Error and Status Messages

Table 5-2 is an alphabetic list of error and status messages that BIOS generates and an explanation of each message. Many of the messages refer to the built in Setup program. For more information about Setup, refer to the *Configuring Your System* chapter.

Table 5-2. BIOS Messages

MESSAGE	DESCRIPTION
Nnnn Cache SRAM Passed	Where <i>nnnn</i> is the amount of system cache in kilobytes successfully tested.
Diskette drive A error or Diskette drive B error	Diskette Drive is present but fails the BIOS POST diskette tests. Check to see that the drive is defined with the proper diskette type in Setup and that the diskette drive is correctly attached.
Entering SETUP ...	The Setup program is starting.
Extended RAM Failed at offset: <i>nnnn</i>*	Extended memory is not working or is not properly configured at offset <i>nnnn</i> .
<i>nnnn</i> Extended RAM passed	Where <i>nnnn</i> is the amount of RAM in kilobytes successfully tested.
Failing Bits: <i>nnnn</i>*	The hex number <i>nnnn</i> is a map of the bits at the RAM address (in System, Extended, or Shadow memory) which failed the memory test. Each 1 (one) in the map indicates a failed bit.
Fixed Disk 0 Failure or Fixed Disk 1 Failure or Fixed Disk Controller Failure*	Fixed disk is not working or not properly configured. Check to see if the fixed disk is attached properly. Run Setup to be sure the fixed disk type is correctly identified.
Incorrect Drive A type - run SETUP or Incorrect Drive B type - run SETUP	Type of floppy drive is not correctly identified in Setup.
Invalid NVRAM media type*	Problem with NVRAM (CMOS) access.
Keyboard controller error*	The keyboard controller test failed. You may have to replace the keyboard or controller.
Keyboard error <i>nn</i>	The keyboard is not working. BIOS discovered a stuck key and displays the scan code <i>nn</i> for the stuck key.
Keyboard locked - Unlock key switch	Unlock the system to proceed.
Monitor type does not match CMOS - Run SETUP	Monitor type is not correctly identified in Setup.
Operating system not found	The operating system cannot be located on either drive A: or drive C:. Enter Setup and see if the fixed disk and floppy are properly identified.
Parity Check 1 <i>nnnn</i>* or Parity Check 2 <i>nnnn</i>*	A parity error was found in the system bus (Parity Check 1) or the I/O bus (Parity Check 2). BIOS attempts to locate and display the address on the screen. If it cannot locate the address, it displays ????.
Press <F1> to resume, <F2> to Setup	Displayed after any recoverable error message.
Press <F2> to enter SETUP	Optional message displayed during POST. Can be turned off in Setup.
Previous boot incomplete - Default configuration used	Previous POST did not successfully complete. POST loads default values and offers to run Setup. If the failure was caused by incorrect values and they are not corrected, the next boot will likely fail. On systems with control of wait states, improper Setup settings can also terminate POST and cause this error on the next boot. Run Setup and verify that the wait-state configuration is correct. This error is cleared the next time the system is booted.
Real time clock error*	Real time clock fails BIOS test. May require board repair.
Shadow Ram Failed at offset: <i>nnnn</i>*	Shadow RAM failed at offset <i>nnnn</i> of the 64K block at which the error was detected.
<i>nnnn</i> Shadow RAM Passed	Where <i>nnnn</i> is the amount of shadow RAM in kilobytes successfully tested.
System battery is dead - Replace and run SETUP	The CMOS clock battery indicator shows the battery is dead. Replace the battery and run Setup to reconfigure the system.
System BIOS shadowed	The system BIOS is copied to shadow RAM.
System cache error - Cache disabled*	The RAM cache failed the BIOS test and BIOS has disabled the cache.

MESSAGE	DESCRIPTION
System CMOS checksum bad - run SETUP	The system CMOS has been corrupted or incorrectly modified, perhaps by an application program that changes data stored in CMOS. Run Setup and reconfigure the system either by getting the default values or making your own selections.
System RAM failed at offset: <i>nnnn</i>*	The system RAM failed at offset <i>nnnn</i> of the 64K block at which the error was detected.
<i>nnnn</i> System RAM Passed	Where <i>nnnn</i> is the amount of system RAM in kilobytes successfully tested.
System timer error*	The timer test failed. Requires repair of the system board.
UMB upper limit segment address: <i>nnnn</i>	Displays the address <i>nnnn</i> of the upper limit of the Upper Memory Blocks, indicating released segments of the BIOS which may be reclaimed by a virtual memory manager.
Video BIOS shadowed	The video BIOS is successfully copied to shadow RAM.

- If your system displays this message, write down the message and notify your customer representative. If your system fails after you made changes in the BIOS Setup menus, you may be able to correct the problem by entering Setup and restoring the original values.

Messages and Beep Codes

Whenever a recoverable error occurs during POST, BIOS displays a message on the video display screen and causes the speaker to beep twice as the message appears. BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails or if an external ROM module does not checksum to zero.

At the beginning of each POST test routine, the BIOS outputs the test point error code to I/O address 80h. If the BIOS detects a terminal error condition, it halts POST after issuing a terminal error beep code signifying the test point code and attempting to display the test point error code on the upper left corner of the display screen. BIOS derives the beep code from the test point error code.

For example, a test point error code of 16 is indicated by a 1-2-2-3 beep code (a single beep, a burst of two beeps, a burst of two beeps, and a burst of three beeps). In addition, BIOS writes a value of 16 on the upper left corner of the display screen and to I/O port 80h to enable debugging tools to identify the area of failure.

Table 5-3 is a list of the test point error codes written at the start of each POST test and the beep codes issued for terminal errors.

Table 5-3 POST Tests

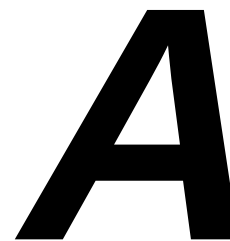
Code	Beeps	POST Routine Description
02	1-1-1-3	Verify Real Mode
04	1-1-2-1	Get CPU type
06	1-1-2-3	Initialize system hardware
08	1-1-3-1	Initialize chipset registers with initial POST values
09	1-1-3-2	Set in POST flag
0A	1-1-3-3	Initialize CPU registers
0C	1-1-4-1	Initialize cache to initial POST values
0E	1-1-4-3	Initialize I/O
10	1-2-1-1	Initialize Power Management

Code	Beeps	POST Routine Description
11	1-2-1-2	Load alternate registers with initial POST values
12	1-2-1-3	Restore CPU control word during warm boot
14	1-2-2-1	Initialize keyboard controller
16	1-2-2-3	BIOS ROM checksum
18	1-2-3-1	8254 timer initialization
1A	1-2-3-3	8237 DMA controller initialization
1C	1-2-4-1	Reset Programmable Interrupt Controller
20	1-3-1-1	Test DRAM refresh
22	1-3-1-3	Test 8742 Keyboard Controller
24	1-3-2-1	Set ES segment register to 4 GB
28	1-3-3-1	Autosize DRAM
2A	1-3-3-3	Clear 512K base RAM
2C	1-3-4-1	RAM failure on address line xxxx*
2E	1-3-4-3	RAM failure on data bits xxxx* of low byte on memory bus
30	1-4-1-1	RAM failure on data bits xxxx* of high byte on memory bus
32	1-4-1-3	Test CPU bus-clock frequency
34	1-4-2-1	Test CMOS RAM
37	1-4-2-4	Reinitialize the chipset (MB only)
38	1-4-3-1	Shadow system BIOS ROM
39	1-4-3-2	Reinitialize the cache (MB only)
3A	1-4-3-3	Autosize cache
3C	1-4-4-1	Configure advanced chipset registers
3D	1-4-4-2	Load alternate registers with CMOS values
40	2-1-1-1	Set Initial CPU speed
42	1-1-1-3	Initialize interrupt vectors
44	2-1-2-1	Initialize BIOS interrupts
46	2-1-2-3	Check ROM copyright notice
47	2-1-2-4	Initialize manager for PCI Option ROMs
48	2-1-3-1	Check video configuration against CMOS
49	2-1-3-2	Initialize PCI bus and devices
4A	2-1-3-3	Initialize all video adapters in system
4C	2-1-4-1	Shadow video BIOS ROM
4E	2-1-4-3	Display copyright notice
50	2-2-1-1	Display CPU type and speed
52	2-2-1-3	Test keyboard
54	2-2-2-1	Set key click if enabled
56	2-2-2-3	Enable keyboard
58	2-2-3-1	Test for unexpected interrupts
5A	2-2-3-3	Display prompt "Press F2 to enter SETUP"
5C	2-2-4-1	Test RAM between 512 and 640K
60	2-3-1-1	Test extended memory
62	2-3-1-3	Test extended memory address lines
64	2-3-2-1	Jump to User Patch1
66	2-3-2-3	Configure advanced cache registers
68	2-3-3-1	Enable external and CPU caches

Code	Beeps	POST Routine Description
6A	2-3-3-3	Display external cache size
6C	2-3-4-1	Display shadow message
6E	2-3-4-3	Display non-disposable segments
70	2-4-1-1	Display error messages
72	2-4-1-3	Check for configuration errors
74	2-4-2-1	Test real-time clock
76	2-4-2-3	Check for keyboard errors
7C	2-4-4-1	Set up hardware interrupt vectors
7E	2-4-4-3	Test coprocessor if present
80	3-1-1-1	Disable onboard I/O ports
82	3-1-1-3	Detect and install external RS232 ports
84	3-1-2-1	Detect and install external parallel ports
86	3-1-2-3	Reinitialize onboard I/O ports
88	3-1-3-1	Initialize BIOS Data Area
8A	3-1-3-3	Initialize Extended BIOS Data Area
8C	3-1-4-1	Initialize floppy controller
90	3-2-1-1	Initialize hard disk drives
91	3-2-1-2	Initialize local-bus hard-disk controller
92	3-2-1-3	Jump to UserPatch2
94	3-2-2-1	Disable A20 address line
96	3-2-2-3	Clear huge ES segment register
98	3-2-3-1	Search for option ROMs. One long, two short beeps on checksum failure
9A	3-2-3-3	Shadow option ROMs
9C	3-2-4-1	Set up Power Management
9E	3-2-4-3	Enable hardware interrupts
A0	3-3-1-1	Set time of day
A2	3-3-1-3	Check key lock
A8	3-3-3-1	Erase F2 prompt
AA	3-3-3-3	Scan for F2 keystroke
AC	3-3-4-1	Enter SETUP
AE	3-3-4-3	Clear in-POST flag
B0	3-4-1-1	Check for errors
B2	3-4-1-3	POST done - prepare to boot operating system
B4	3-4-2-1	One short beep before boot
B6	3-4-2-3	Check password (optional)
B8	3-4-3-1	Clear global descriptor table
BC	3-4-4-1	Clear parity checkers
BE	3-4-4-3	Clear screen (optional)
BF	3-4-4-4	Check virus and backup reminders
C0	4-1-1-1	Try to boot with INT 19
D0	4-2-1-1	Interrupt handler error
D2	4-2-1-3	Unknown interrupt error
D4	4-2-2-1	Pending interrupt error
D6	4-2-2-3	Initialize option ROM error
D8	4-2-3-1	Shutdown error

Code	Beeps	POST Routine Description
DA	4-2-3-3	Extended Block Move
DC	4-2-4-1	Shutdown 10 error
DE	4-2-4-3	Keyboard Controller Failure
The following are for boot block in FLASH ROM		
E2	4-3-1-3	Initialize the chipset
E3	4-3-1-4	Initialize refresh counter
E4	4-3-2-1	Check for Forced Flash
E5	4-3-2-2	Check HW status of ROM
E6	4-3-2-3	BIOS ROM is OK
E7	4-3-2-4	Do a complete RAM test
E8	4-3-3-1	Do OEM initialization
E9	4-3-3-2	Initialize interrupt controller
EA	4-3-3-3	Read in the bootstrap code
EB	4-3-3-4	Initialize all vectors
EC	4-3-4-1	Boot the Flash program
ED	4-3-4-2	Initialize the boot device
EE	4-3-4-3	Boot code was read OK

* If the BIOS detects error 2C, 2E, or 30 (base 512K RAM error), it displays an additional word-bitmap (xxxx) indicating the address line or bits that failed. For example, "2E 0B10" means data bits 12 and 5 (bits 12 and 5 set) have failed in the lower 16 bits.



System Cabling

- System Cabling
- Static Precautions
- Standard Configuration
- RAID Configuration

System Cabling

This appendix contains information and procedures on cabling configurations used in your system.

The cabling configurations include:

- Standard Configuration
- RAID Configuration.

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Standard Configuration

Your system is cabled using a single channel on-board Adaptec 7860 controller and a single on-board Adaptec 7880 controller. The Adaptec 7860 controller supports the standard internally mounted CD-ROM.

The Adaptec 7880 contains a SCSI controller that uses a PCI bus master interface. Internally, the controller is capable of operations using either 8- or 16-bit SCSI providing 10 MB/s (Fast-10) or 20 MB/s (Fast-20) throughput, or 20 MB/s (Ultra) or 40 MB/s (Ultra-wide) throughput. As implemented on the system board, this controller attaches to an Ultra-2 SCSI backplane that supports up to seven Ultra-2 SCA drives.

A 3.5-inch diskette drive is also installed in all systems and interfaces separately to the system board.

Referring to Figure A-1, a 68-pin wide SCSI interface cable (K) is connected to the SCSI connector (J) in the upper edge of the system board. This cable connects to the front of the hard disk drive's SCSI backplane (V).

The IDE interface cable is not connected to the IDE connector (U) towards the left edge of the system board. Instead it is in the accessory box.

Optional internally mounted SCSI removable media devices may be connected to the SCSI controller connector or optional internally mounted IDE removable media devices may be connected to the IDE controller connector.

When adding or removing IDE devices, consider the following:

 **Note:** Only one IDE cable is supplied with the system.

-
- The system board supports a primary IDE channel connector which supports two devices.
 - A first (master) device and a second (slave) device are supported on the IDE controller.
 - The device configuration, master versus slave, is determined by jumpers on the devices. Cable Sense (CS) device configuration is not supported.
 - If only one device is on a channel connector it must be set as the master device.

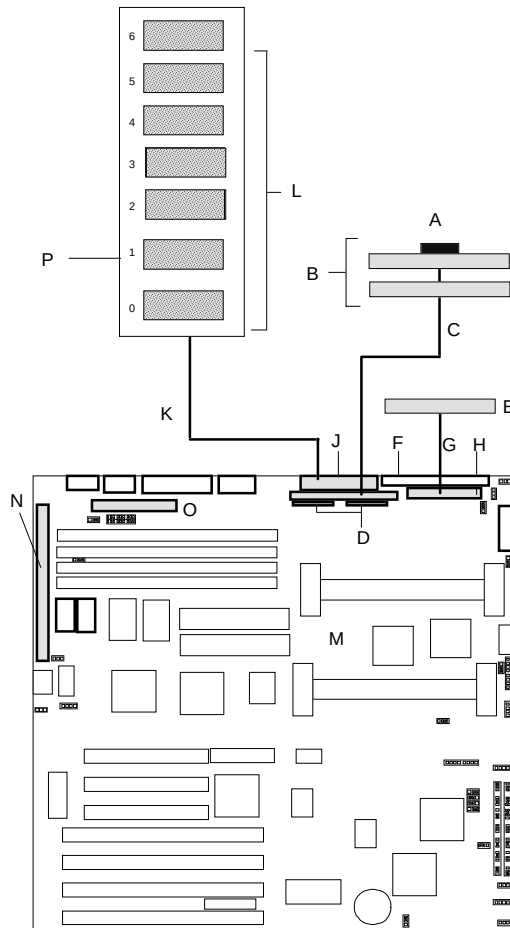


Figure A-1 Standard System Cable Configuration

- | | |
|---|---|
| A. Device internal SCSI termination resistors | J. Wide SCSI connector (68 pin) |
| B. Optional narrow SCSI devices in upper peripheral bays | K. Wide SCSI interface cable |
| C. Narrow SCSI interface cable | L. Wide SCSI Hard disk drives in internal bays |
| D. Internal SCSI termination resistors (not installed when optional internal narrow SCSI devices are used) | M. System board |
| E. 3.5-inch diskette drive | N. I/O riser board |
| F. Front panel connector | O. IDE connector |
| G. Diskette interface cable | P. SCSI distribution panel |
| H. Diskette drive connector | |

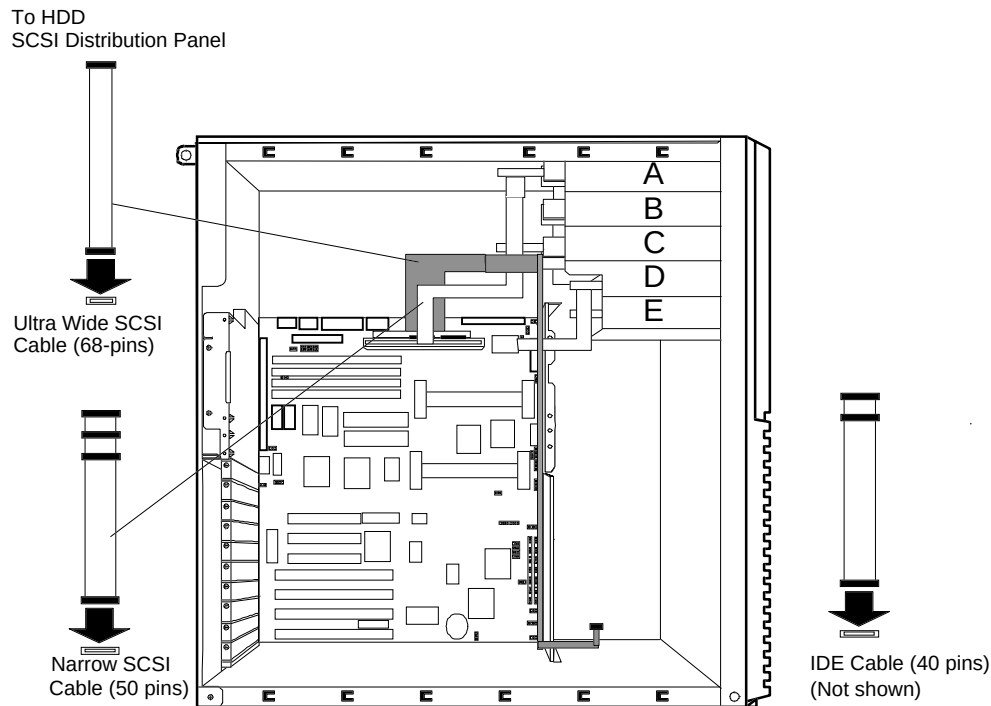


Figure A-2 Standard System Cable Routing

RAID Configuration

The RAID options available for your system are the Mylex AcceleRAID™ 150 and the Mylex AcceleRAID 250 Controller boards, which gives your system the added security of fault tolerance.

If you order a system with a RAID controller, the system is pre-cabled at the factory (see Figures A-3 and A-4.)

If you are adding either the AcceleRAID™ 150 or the AcceleRAID 250 Controller you must install, cable, and configure the controller. Refer to "Installing a RAID Controller Board" in Chapter 4.

Note that Jumper JP10 (see Figure A-5) that enables the SCSI Interrupt Steering Logic (SISL) control on the RAID controller must be in its off position (not jumpered), which is its default position.

Note: The jumper is set correctly at the factory for your system configuration. If your system requires a jumper change, change only the jumper setting for that condition. Otherwise, keep the jumper at its factory setting.

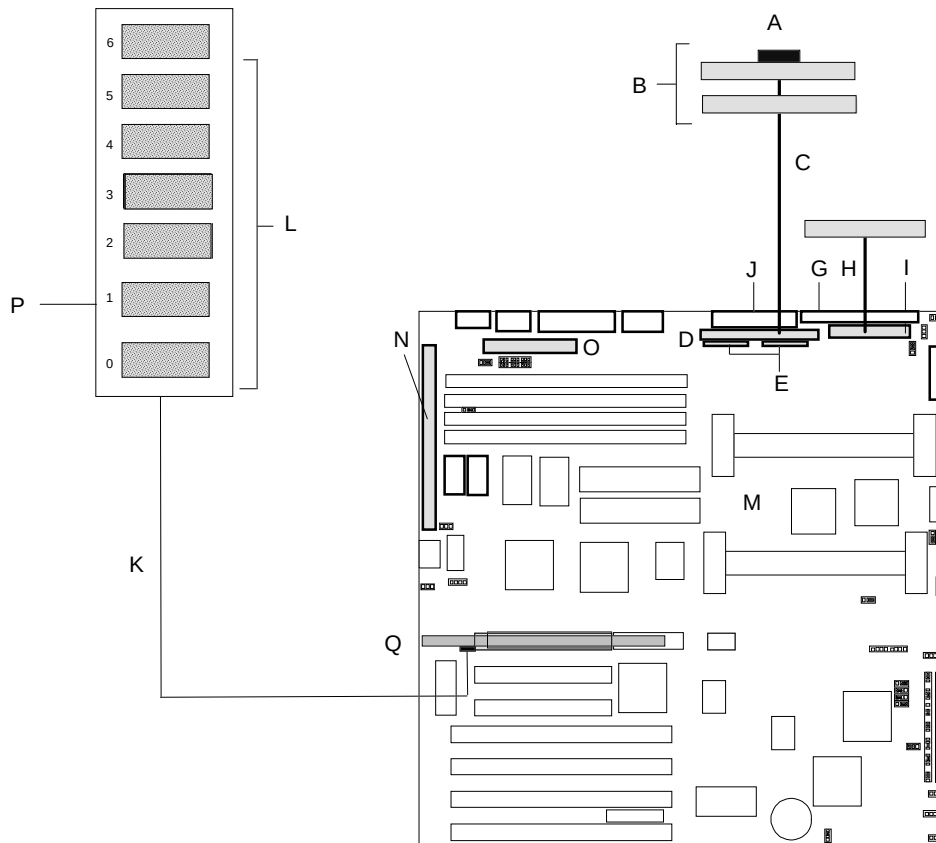


Figure A-3 RAID System Cable Configuration

- | | | | |
|----|---|----|--|
| A. | Device internal SCSI termination resistors | B. | Narrow SCSI devices in upper peripheral bays, including SCSI CD-ROM drive. |
| C. | Narrow SCSI interface cable | D. | Narrow SCSI connector (50 pin) |
| E. | Internal SCSI termination resistors (not installed) | F. | 3.5-inch diskette drive |
| G. | Front panel connector | H. | Diskette interface cable |
| I. | Diskette drive connector | J. | Wide SCSI connector (68 pin) |
| K. | Wide SCSI interface cable | L. | Wide SCSI Hard disk drives in internal bays |
| M. | System board | N. | I/O riser board |
| O. | IDE connector | P. | SCSI distribution panel |
| Q. | DAC960 RAID controller in PCI slot J11 | | |

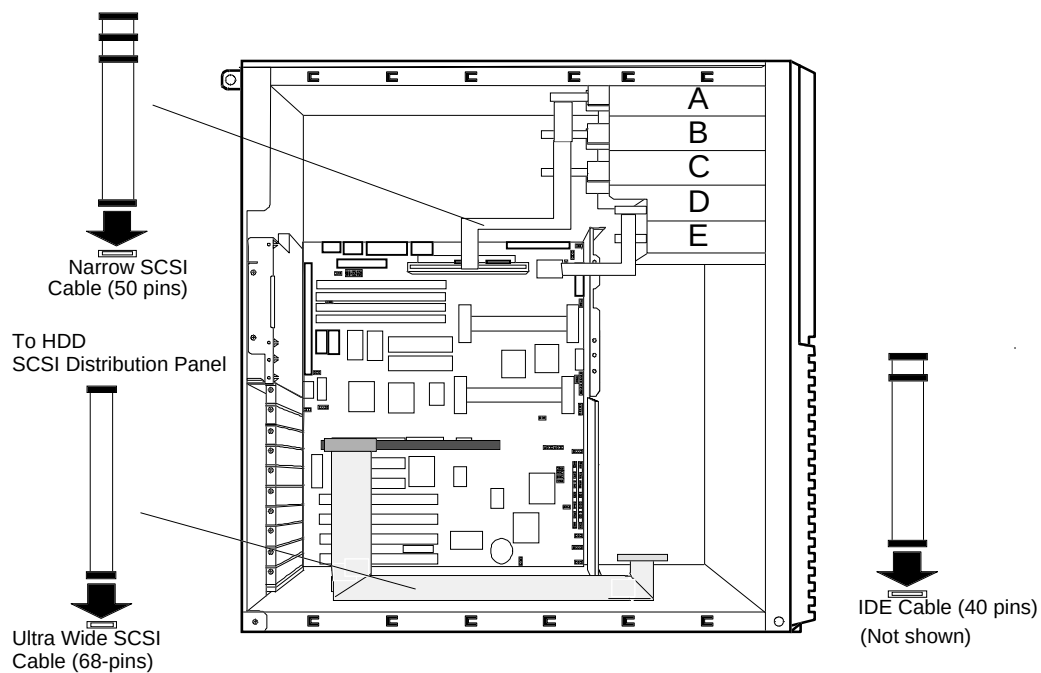


Figure A-4 RAID System Cable Routing

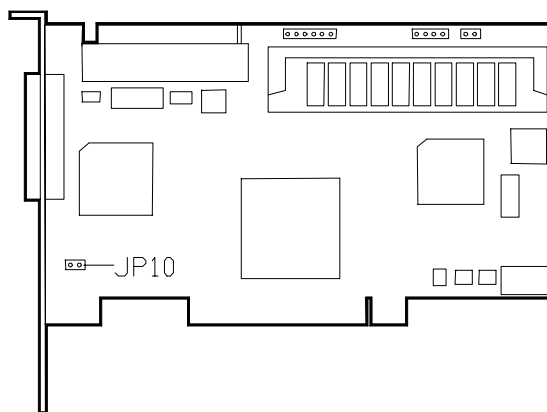
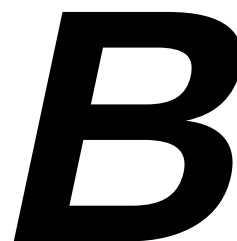


Figure A-5 AcceleRAID Jumper JP10



System Status Hardware Support Information

System Status Hardware Support Information

This appendix helps you identify and find a system status hardware items indicated by one of several software monitoring components.

The software monitoring components as they are related to the hardware system status items are listed in the following table:

Software Monitoring Components/Hardware System Status Items

Software Monitoring Component	Hardware System Status Item
ESMPRO Server Management	View status based on polling the machine
EMP / RCU	View status in the hardware system event log

Not all items can be monitored with every software component. Monitoring capability relates to how the software component interacts with system hardware. ESMPRO interacts with all hardware components and EMP/RCU interacts with Baseboard hardware. In this system, the SCSI Accessed Fault-Tolerant Enclosure (SAF-TE) interface board is connected to the SCSI backplane. (See Figure "System Chassis (Right Side View)" under "System Overview" in Chapter 1 of this guide.)

The "Monitor Matrix" table below shows which component relates to selected status items. This table also relates the terminology used by the software component to the system hardware.

Monitor Matrix

Item	ESM PRO	EMP / RCU	Item Location	Board Marking
Chassis front fan	As Item	N/A	BB	J7
Chassis upper rear fan	N/A	N/A	Pwr. Bd	J11
Chassis lower rear fan	N/A	N/A	Pwr. Bd	J12
Internal disk fan – upper	Internal upper disk (SAF-TE)	N/A	SCSI-BP	J2
Internal disk fan – middle	Middle	N/A	SCSI-BP	J1
Internal disk fan – lower	Lower	N/A	SCSI-BP	J3
Intrusion switch - front	Chassis cover	N/A	SCSI-BP	J6
Interlock switch - left side (front view)	N/A	N/A	SCSI-BP	J5 pins 1, 2
Interlock switch - right side (front view)	N/A	N/A	SCSI-BP	J5 pins 3, 4
(1)Power Supply fan	(1) Power (SAF-TE)	N/A	P. S. (Bottom)	N/A
(2)Power Supply fan	(2) Power (SAF-TE)	N/A	P.S. (Top)	N/A

BB = Baseboard
SCSI-BP = SCSI Backplane

Glossary

A

AC

(Alternating Current) The type of current available in wall outlets. All computers must convert alternating current to direct current to operate. See also DC.

address

A label, name, or number that identifies a location in computer memory.

ASCII

(American Standard Code for Information Interchange) A standard number assigned to each of the alphanumeric characters and keyboard control code keys to enable the transfer of information between different types of computers and peripherals.

B

backplane slot

A connector on the backplane board in desktop computers and expansion boxes that allows you to install circuit cards.

backup

A copy of data for safe-keeping. The data is copied from computer memory or disk to a floppy disk, magnetic tape, or other media.

backup battery

The battery in your computer that maintains the real-time clock and the configuration information when the computer's power is removed.

base memory

An area of memory between 0 and 640 kilobytes.

baud rate

The speed with which data is transmitted during serial communication. The computer's operating system and software program must be configured for the same baud rate as the communication device, such as a serial printer. See also bps.

BIOS

(Basic Input/Output System) A program stored in flash EPROM or ROM that controls the keyboard, disk drives, video monitor, and other devices. See also flash EPROM, EPROM, and ROM.

bit

Derived from BInary digiT, a bit is the smallest unit of information a computer handles. See also byte.

BMC

(Baseboard Management Controller) Contains all of the server management functions. One major function of the BMC is to monitor system management events and log their occurrence in the System Event Log (SEL).

boot

The process of loading the operating system into memory.

bps

(bits per second) The number of bits transferred in one second during serial communication, such as modem transmission.

byte

A group of eight bits.

C**cache memory**

A very fast, limited portion of RAM set aside for temporary storage of data for direct access by the microprocessor.

CD-ROM drive

(Compact Disk ROM drive) A type of mass storage device that reads information from a compact disk.

Centronics port

An industry standard parallel port. See also parallel port.

CGA

(Color Graphics Adapter) A type of video display system that provides low-resolution text and graphics on TTL monochrome and color monitors.

CMOS

(Complimentary Metal-Oxide Semiconductor) A type of low-power integrated circuit used in computers. See also TTL.

COM1 or COM2

The name you can assign a serial port to set or change its address. See also serial port.

command

An instruction that directs the computer to perform a particular operation.

configuration

The way in which a computer is set up to operate. Some configurable options include CPU speed, serial port designation, and memory allocation.

coprocessor

See math coprocessor.

CPU

(Central Processing Unit) See microprocessor.

CRT

(Cathode-Ray Tube) The type of video display used in monitors for desktop computers.

D**DC**

(Direct Current) The type of current available in the rechargeable battery packs used in portable computers. See also AC.

default

The factory setting your computer uses unless you instruct it otherwise. For example, when powering up, the computer will boot from the default drive.

density

The capacity of information (bytes) that can be packed onto a storage device, such as a floppy disk.

device driver

A software program that a computer must use to recognize and operate certain hardware, such as a mouse or a video monitor.

disk drive

A device that stores data on a hard or floppy disk. A floppy disk drive requires a floppy disk to be inserted; a hard disk drive has a permanently encased hard disk.

DOS

(Disk Operating System) See operating system.

DRAM

(Dynamic RAM) See RAM.

E**ECC**

(Error Checking and Correction) A method of detecting and correcting errors.

EEPROM

(Electrically Erasable Programmable Read-Only Memory) A type of memory device that stores password and configuration information.

EGA

(Enhanced Graphics Adapter) A type of video display system that provides medium-resolution text and graphics on TTL monochrome, color, and enhanced color monitors.

EMP

The Emergency Management Port (EMP) provides an interface to the Console Manager. This interface allows remote server management via a modem or direct connection.

EMS

(Expanded Memory Specification) A method of accessing memory beyond the 640K limit of DOS by exchanging data in and out of main memory at high speeds. Some software requires EMS to operate.

EPROM

(Erasable Programmable Read-Only Memory) A type of memory device that is usually used to store system BIOS code. This code can be erased with ultraviolet light, but is not lost when the computer is powered off. See also flash EPROM and ROM.

expanded memory

See EMS.

expansion slot

See backplane slot.

extended memory

The protected memory above 1M that is directly accessible by the microprocessor through certain utilities and operating systems. This memory is used in computers with 80286, 80386, and 80486 microprocessors.

F**flash EPROM**

A type of memory device that is usually used to store system BIOS code. This code can be replaced with updated code from a floppy disk, but is not lost when the computer is powered off. See also EPROM and ROM.

floppy disk drive

See disk drive.

format

The process used to organize a hard or floppy disk into sectors so it can accept data. Formatting destroys all previous data on the disk.

G**(Gigabyte)**

1,073,741,824 bytes. See also byte.

H

hard disk drive

See disk drive.

hardware

The physical parts of your computer, including the keyboard, monitor, disk drives, cables, and circuit cards.

hot swap

A method used to insert or remove SCSI disk drives into or from an operating bus. This method is typically used in RAID subsystems. When used in non-RAID subsystems the operating system must typically be restarted.

I

IC

(Integrated Circuit) An electronic device that contains miniaturized circuitry.

(ISA Configuration Utility)

The program that you use to change the configuration of some ISA desktop computers. This program also contains information about the hardware in the computer.

IDE

(Integrated Drive Electronics) A type of hard disk drive with the control circuitry located inside the disk drive rather than on a drive controller card.

interface.

A connection between the computer and a peripheral device that enables them to exchange data. See also parallel port and serial port.

ISA

(Industry Standard Architecture) An industry standard for computers and circuit cards that transfer 16 bits of data at a time.

J

jumper

A small electrical connector used for configuration on some computer hardware.

K

(Kilobyte)

1,024 bytes. See also byte.

L

LAN

(Local Area Network) A group of computers linked together within a limited area to exchange information.

LCD

(Liquid Crystal Display) The type of video display used in portable computers.

LED

(Light-Emitting Diode) A small electronic device that glows when current flows through it.

LPT1 or LPT2

The name you can assign a parallel port to specify its address. See also parallel port.

LVD

Super-fast Ultra 2 SCSI Low Voltage Differential (LVD) Parallel SCSI Interface. A new SCSI interface that provides greater I/O bandwidth, device connectivity, data reliability, and longer cable lengths for Ultra2 SCSI hard disk drives. Note that in order to achieve LVD performance all devices including cable, controller, and drive must support LVD.

M

(Megabyte)

1,048,576 bytes. See also byte.

math coprocessor

An IC that works with the microprocessor to speed up mathematical calculations.

memory

The circuitry in your computer that stores data and programs. See also EMS, extended memory, RAM, and ROM.

microprocessor

The integrated circuit that processes data and controls the basic functions of the computer.

modem

A device used to exchange information with other computers over telephone or data lines.

module

A circuit board that plugs into a dedicated connector on the system board in your computer.

mouse

A small input device that you guide on a flat surface to control the cursor movement and operation of the computer when using certain software programs.

N

NVRAM

(Nonvolatile RAM) A type of RAM that retains its contents even after the computer is powered off. This memory stores EISA configuration information. See also RAM and SRAM.

O

operating system

A set of programs that provides the interface between other software programs and the computer.

P

parallel port

The connector on the back of your computer that allows the transfer of data between the computer and a parallel device, such as a parallel printer.

partition

The process of dividing the storage space on a hard disk into separate areas so that the operating system treats them as separate disk drives.

password

A security feature that prevents an unauthorized user from operating your computer. See also EEPROM.

PCI

Peripheral Component Interconnect. PCI is a high-performance peripherals I/O bus supporting data transfers of up to 132MB per second.

Pentium

A type of microprocessor, with a built-in math coprocessor, cache memory, and memory and bus controllers, that processes and communicates 32 bits of data at a time. This microprocessor also contains power management capabilities.

peripheral

A device connected to and controlled by the computer, such as an external disk drive or a printer.

pixel

The smallest element that is visible on a video display. The resolution of a video display system is measured in pixels.

PnP

(Plug-n-Play) Plug-and-play is the ability to plug a device into a computer and have the computer recognize that the device is there. The user doesn't have to tell the computer.

POST

Power-On-Self-Test.

R**RAM**

(Random-Access Memory) A temporary storage area for data and programs. This type of memory must be periodically refreshed to maintain valid data, and is lost when the computer is powered off. See also NVRAM and SRAM.

real-time clock

The IC in your computer that maintains the time and date.

ROM

(Read-Only Memory) A type of memory device that usually is used to store system BIOS code. This code cannot be altered and is not lost when the computer is powered off. See also BIOS, EPROM, and flash EPROM.

RS-232C port

An industry standard serial port. See also serial port.

S**SAF-TE**

(SCSI Accessed Fault Tolerant Enclosure) A specification for monitoring the state of the drives and enclosure environment (fan, power supply, temperature, etc.) using the SCSI bus to indicate faults.

save

To store information on a floppy disk, hard disk, magnetic tape, or some other permanent storage device.

SCSI

(Small Computer System Interface) An industry standard interface that provides high-speed access to tape drives, hard disk drives, and other peripheral devices.

SEL

(System Event Log) A record of system management events. The information stored includes the name of the event, the date and time the event occurred and data pertinent to the event. Event data may include POST error codes that reflect hardware errors or software conflicts within the system.

serial communication

Information sent sequentially, one bit at a time.

serial port

The connector on the back of your computer that allows the transfer of data between the computer and a serial device, such as a mouse, a modem, or a serial printer.

Setup program

The program that you use to change the configuration of some ISA desktop and notebook computers. This program also contains information about the hardware in the computer.

software

Programs with specific functions, such as word processing, data base management, communications, and operating system.

SRAM

(Static RAM) A temporary storage area for data and programs. This type of memory does not need to be refreshed, but it is lost when the computer is powered off. See also NVRAM and RAM.

SSU

(System Setup Utility) The program that you use to change the configuration of your system. This program also contains information about the hardware in your system and is used to read the System Event Log.

SVGA

(Super VGA) A type of video display system that provides very high-resolution text and graphics on analog color monitors.

system board

The main circuit board in your computer. It contains most of the connectors and ports.

T**tape drive**

A type of storage device using magnetic tape.

TTL

(Transistor-Transistor Logic) A type of integrated circuit used in computers. See also CMOS.

V**VGA**

(Video Graphics Array) A type of video display system that provides high-resolution text and graphics on analog color monitors.

Equipment Log

Use this equipment log form to record pertinent information about your system. You will need some of this information to run the System Setup Utility. Be sure to update the equipment log when you add options.

Record the model and serial numbers of the system components, dates of component removal or replacement, and the name of the vendor from whom the component was purchased. Be sure to record the same information for any components added to the system, such as hard disk drives, add-in boards, or printers.

Record the model and serial numbers of the unit and system baseboard. The model and serial numbers of the system unit are recorded on a label attached to the rear of the unit. The serial number of the system board is located along the left side of the board, near the PCI expansion slot covers.

The location of serial numbers on add-in boards, hard disk drives, and external equipment, such as video displays or printers, varies from one manufacturer to another. Literature accompanying these products should illustrate or describe the location of model and serial numbers.

Component	Manufacturer Name & Model	Serial Number (if available)	Date Installed
Server			
System Board			
Processor 1			
Processor 2			
DIMM Slot 1			
DIMM Slot 2			
DIMM Slot 3			
DIMM Slot 4			
Modem			
Diskette Drive A			
Diskette Drive B			
Tape Drive 1			
Tape Drive 2			
CD-ROM Drive 1			
Hard Disk Drive 1			
Hard Disk Drive 2			
Hard Disk Drive 3			
Hard Disk Drive 4			
Hard Disk Drive 5			
Hard Disk Drive 6			
Hard Disk Drive 7			
Optional RAID Controller			
Network Controller 1			
Network Controller 2			
Monitor			
Keyboard			
Mouse			
External Peripheral 1			
External Peripheral 2			

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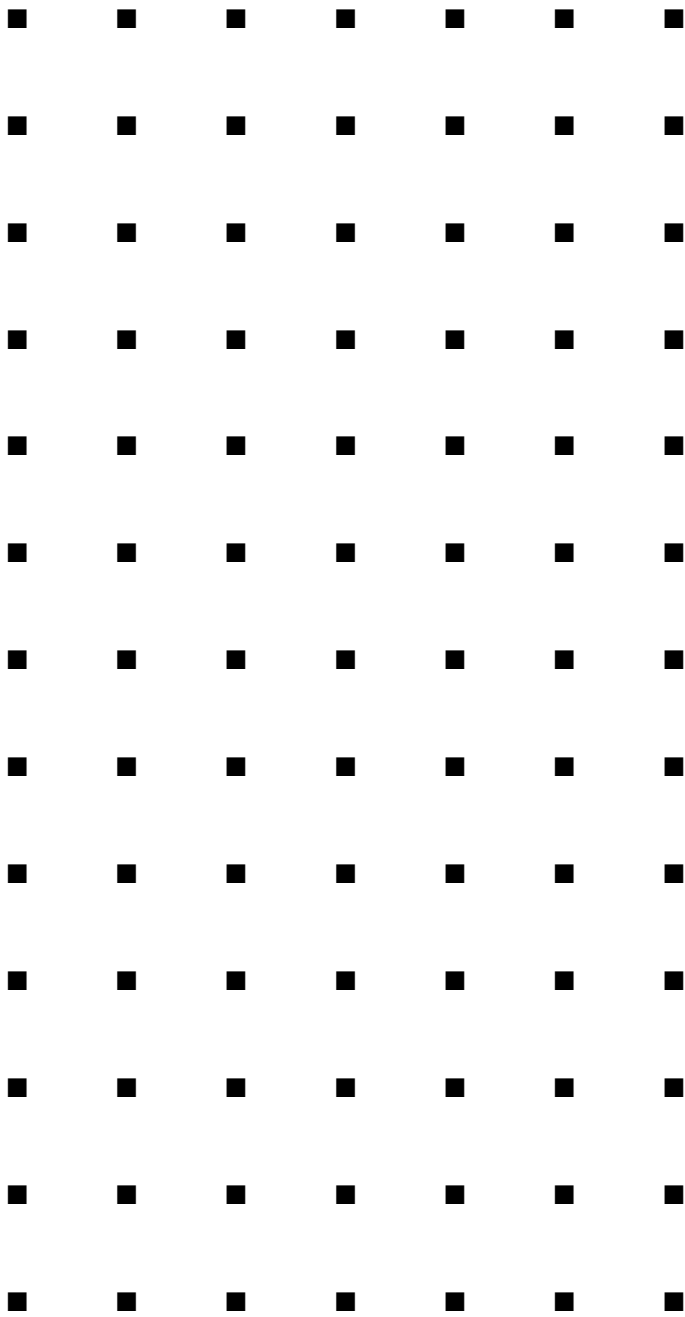
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